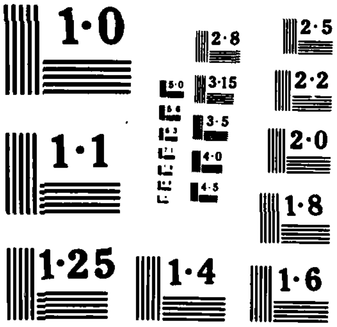
AD-A152 687 MANUFACTURING METHODS AND TECHNOLOGY FOR DIGITAL FAULT 1/1
ISOLATION OF HYBRI..(U) HUGHES AIRCRAFT CO FULLERTON CA
GROUND SYSTEMS GROUP 01 MAR 82 HAC-FR-82-12-193
UNCLASSIFIED DAAH01-81-D-A002 F/G 9/5 NL


1·0
2·8
2·5
5·0
3·15
2·2
3·5
1·1
2·0
4·0
4·5
1·8
1·25
1·4
1·6

(1)

Final Report

Attachment I - Distributed Software Elements

Manufacturing Methods And Technology For Digital Fault Isolation Of Hybrid Microelectronic Assemblies

Project No. 1023

1 MARCH 1982
CONTRACT NO. DAAH-01-81-D-A002

FINAL REPORT ATTACHMENT I -

DISTRIBUTED SOFTWARE ELEMENTS
Manufacturing Methods and Technology for Digital Fault Isolation of Hybrid Microelectronic Assemblies

Project No. 1023

Prepared for
U.S. Army Missile Command
Redstone Arsenal, Alabama 35809

Project Officer: G. D. Little
DR SMI-RST
(205)-876-3604

Contract No. DAAH 01-81-D-A002
Task 0007
CDRL 002

Prepared by

Hughes Aircraft Company
Ground Systems Group
Fullerton, California 92634

Report Date: 1 March 1982
FR 82-12-193

FINAL REPORT ATTACHMENT I -

DISTRIBUTED SOFTWARE ELEMENTS
Manufacturing Methods and Technology for
Digital Fault Isolation of Hybrid Microelectronic Assemblies

Project No. 1023

Prepared for
U.S. Army Missile Command
Redstone Arsenal, Alabama 35809

Project Officer: G. D. Little
DR SMI-RST
(205)-876-3604

Contract No. DAAH 01-81-D-A002
Task 0007
CDRL 002

Prepared by

Hughes Aircraft Company
Ground Systems Group
Fullerton, California 92634

Report Date: 1 March 1982
FR 82-12-193

FOREWORD

This final report presents the results, supporting data, and recommendations relating to an automatic test probe system (Autoprobe or AP), performed by Task 0007, under contract DAAH 01-81-D-A002. The program was identified as Project 1023 by the U.S. Army Missile Command at Redstone Arsenal, Alabama.

The manufacturing technology effort described by this report covers automatic test and fault isolation of digital hybrid microelectronic devices (D/HMAs) used in current and future production missile systems. A need for the single automatic probe, or Autoprobe, system was established by high production rate test and fault isolation of D/HMAs having complex LSI, microprocessor devices, and large number of I/O interconnections. Hardware and software resulting from project 1023 was further to be applied to the ATE system previously installed at Redstone Arsenal under project R783242.

An overview and objectives of project 1023 (or HFI Program) are presented in Section 1 of this report. Section 2 describes the work accomplished and includes the successful results of the Industry Demonstration for test and fault isolation of a D/HAM. Section 3 contains recommendations to achieve a full production type Autoprobe system and suggested future effort or study towards necessary AP improvements.

This document only provide two Fortran language programs and two machine language programs that were compiled.

A-1

CONTENTS

SECTION I

PROBE CONTROL DRIVER

REFERENCE: FINAL REPORT SECTION 2, SUBSECTION E.1, ...PAGE 2-20

1. INTPR - AUTOPROBE INITIALIZER

2. MONPR - AUTOPROBE MONITOR/DRIVER

3. SERCH - TEST POINT FILENAME LOOKUP

4. READY - WAIT FOR AUTOPROBE READY

5. ERROR - PROBE DRIVER ERROR HANDLER

6. BEROR - BUS ERROR HANDLER

```
FTN4,L
      PROGRAM INTPR
C     =============
C
C     SON PROGRAM INTPR IS CALLED BY FATHER PROGRAM PCDRV
C     ONCE ONLY.  PCDRV PASSES HYBRID FILE NAME VIA RMPAR.
C     INTPR PASSES BACK NORMAL (1) OR ABNORMAL TERMINATION
C     (-1) VIA PRTN. IF ABNORMAL, BOTH PROGRAMS ABORT.
C
C
      INTEGER FNAME(3),DCB(144),BFR(13),PARM(5)
      INTEGER ASD(3),ASE(3),AASD(3),AASE(3),BASD(3),BASE(3)
C
      EQUIVALENCE (ASD(1),BFR(8)), (ASE(1),BFR(11))
C
C ------ RETRIEVE HYBRID TABLE FILE NAME ------
C
      CALL RMPAR (PARM)
      DO 10 I=1,3
10    FNAME(I) = PARM(I)
C
C ------        OPEN HYBRID TABLE FILE        ------
C ------ SET BIT 0 FOR NON-EXCLUSIVE OPEN ------
C
      IERR = 0
      CALL OPEN (DCB,IERR,FNAME,1B)
      IF (IERR.LT.0) GO TO 90
C
C ------ READ AND SAVE POINTS A AND B ------
C
      CALL READF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
      DO 12 I=1,3
      AASD(I) = ASD(I)
12    AASE(I) = ASE(I)
C
      CALL READF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
      DO 14 I=1,3
      BASD(I) = ASD(I)
14    BASE(I) = ASE(I)
C
C ------        PREPARE FOR MONITORING        ------
C ------ CHECK IF ALL READY, SET AUTO MODE ------
C
      LU = 36
      CALL CLEAR (LU,1)
C
      ITMP = 0
      IEFLG = 0
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG.LT.0) GO TO 95
C
      ITMP = 0
```

```
            IEFLG = 0
      20    ICMD = 2HM0
            WRITE (LU,120) ICMD
      120   FORMAT (A2)
      C
      C ------  RETRIEVE POINT A AND SEND COORDINATES  ------
      C ------ FORMAT: AX <COORD> AY <COORD> <CR> <LF> ------
      C
            CALL READY (LU,IERR)
            IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
            IF (IEFLG) 95,30,20
      C
      30    ITMP = 0
            IEFLG = 0
      35    ICM1 = 2HAX
            ICM2 = 2HAY
            WRITE (LU,135) ICM1,AASD,ICM2,AASE
      135   FORMAT (2(A2,3A2))
      C
      C ------  RETRIEVE POINT B AND SEND COORDINATES  ------
      C ------ FORMAT: BX <COORD> BY <COORD> <CR> <LF> ------
      C
            CALL READY (LU,IERR)
            IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
            IF (IEFLG) 95,40,35
      C
      40    ITMP = 0
            IEFLG = 0
      45    ICM1 = 2HBX
            ICM2 = 2HBY
            WRITE (LU,135) ICM1,BASD,ICM2,BASE
      C
      C ------ SEND LOAD HYBRID COMMAND ------
      C
            CALL READY (LU,IERR)
            IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
            IF (IEFLG) 95,47,45
      C
      47    ITMP = 0
            IEFLG = 0
      50    ICMD = 2HLD
            WRITE (LU,120) ICMD
      C
            CALL READY (LU,IERR)
            IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
            IF (IEFLG) 95,80,50
      C
      C ------ CLOSE FILE THEN SEND PROGRAM STATUS TO PAPA ------
      C
      80    PARM(1) = 1
      85    CALL CLOSE (DCB)
            CALL PRTN (PARM)
            CALL EXEC (6)
      C
      C ------ ERROR CONDITION, ABORT PROGRAM ------
```

```
0111   C
0112   99     WRITE (1,199) IERR
0113   199    FORMAT (/"*** FMP ERROR ",I5," ***")
0114          CALL CLEAR (LU,1)
0115   95     PARM(1) = -1
0116          GO TO 65
0117          END


  FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


** NO WARNINGS ** NO ERRORS **   PROGRAM = [illegible]       COMMON = [illegible]
```

```
            SUBROUTINE BEROR (IERRC,IERRP,IEFLG)
      C     ===================================
      C
      C
      C ------ IS ERROR FATAL OR NON-FATAL? ------
      C
            IF (IAND (IERRC,100000B).NE.0) GO TO 30
      C
      C ------ NON-FATAL, IS IT THE SAME AS PREVIOUS CODE? ------
      C
            IERRC = IERRC/256
            IF (IERRC.NE.IERRP) GO TO 10
            IEFLG = IEFLG + 1
            GO TO 20
      C
      10    IEFLG = 1
            IERRP = IERRC
      C
      C ------ PRINT NON-FATAL ERROR MESSAGE ------
      C
      20    WRITE (1,120) IERRC
      120   FORMAT (/"*** NON-FATAL BUS ERROR ",I5," ***")
      C
      C ------ SAME NON-FATAL ERROR 3 TIMES?  IF YES, ABORT ------
      C
            IF (IEFLG.EQ.3) GO TO 40
            PAUSE
            RETURN
      C
      C ------ FATAL, PRINT FATAL ERROR MESSAGE AND ABORT ------
      C
      30    IERRC = IERRC/256
            WRITE (1,130) IERRC
      130   FORMAT (/"*** FATAL BUS ERROR ",I5," ***")
      C
      40    IEFLG = -99
            CALL CLEAR (LU,1)
            PAUSE
            RETURN
            END
```

```
 FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00125      COMMON = 00000
```

```
      SUBROUTINE READY (LU,IERR)
C     ==========================
C
C
      INTEGER MSG(2)
C
C ------ DELAY FOR 500 MILLISECONDS ------
C
      IRESL = 1
      IMULT = 0
      IOFST = -50
10    CALL EXEC (12,0,IRESL,IMULT,IOFST)
C
C ------ READY FOR DATA?  CHECK "BUSY" AND "ERROR" BITS ------
C
      ICMD = 2H??
      WRITE (LU,100) ICMD
100   FORMAT (A2)
      READ (LU,110) MSG
110   FORMAT (2A2)
      IF (IAND (MSG(1),10000B).NE.0) GO TO 10
      IF (IAND (MSG(1),2000B).NE.0) GO TO 20
C
      IERR = 0
      RETURN
C
20    ICMD = 2HSE
      WRITE (LU,100) ICMD
      READ (LU,110) MSG
      IERR = MSG(1)
      RETURN
      END
```

```
  FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


  **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00104      COMMON = 000
```

```
FTN4,L
      PROGRAM HYBRD
C     =============
C
C
      INTEGER FNAME(3)
C
C ------ DISPLAY SELECTION OF TASKS ------
C
10    WRITE (1,100)
100   FORMAT (//"TASKS FOR HYBRID TABLE FILES",
     &//4X,"1 - ENTER FILE",/4X,"2 - INITIALIZE A,B",
     &/4X,"3 - DISPLAY FILE",/4X,"4 - MODIFY FILE",
     &/4X,"5 - TEST PROBER",/4X,"6 - EXIT TASKS"/)
C
C ------ MAKE A SELECTION ------
C
20    WRITE (1,120)
120   FORMAT ("ENTER NUMBER OF SELECTION: _")
      READ (1,*) N
      IF (N.LT.1.OR.N.GT.6) GO TO 20
      IF (N.EQ.6) GO TO 40
C
      WRITE (1,130)
130   FORMAT (//"NAME OF HYBRID TABLE FILE? _")
      READ (1,135) FNAME
135   FORMAT (3A2)
      GO TO (1,2,3,4,5) N
C
C ------ CALL TASK PROGRAM AND EXECUTE ------
C
1     CALL ENTER (FNAME)
      GO TO 10
C
2     CALL INTAB (FNAME)
      GO TO 10
C
3     CALL DSPLY (FNAME)
      GO TO 10
C
4     CALL MODFY (FNAME)
      GO TO 10
C
5     CALL TEST (FNAME)
      GO TO 10
C
C ------ EXIT, NO MORE TASKS TO DO ------
C
40    WRITE (1,140)
140   FORMAT (//"EXIT TASKS FOR HYBRID TABLE FILES")
      CALL EXEC (6)
      END
      SUBROUTINE ALIGN (IXA,IYA,IXB,IYB)
C     ==================================
C
C
      COMMON /VALS/ XA,YA,XB,YB,XM,YM,ABSLP,CDSLP,VFLG,HFLG
C
      INTEGER VFLG,HFLG
C
      XA = FLOAT (IXA)
      YA = FLOAT (IYA)
      XB = FLOAT (IXB)
      YB = FLOAT (IYB)
C
C ------ CHANGE PTS TO NEW COORD SYSTEM WITH MIDPT M ------
C
      XM = (XA + XB) / 2.
      YM = (YA + YB) / 2.
C
      XA = XA - XM
      YA = YA - YM
      XB = XB - XM
      YB = YB - YM
C
C ------ CHECK FOR VERTICAL/HORIZONTAL REFERENCE ------
C
      VFLG = 0
      HFLG = 0
      IF (ABS (XA-XB).LT.1.0) GO TO 10
      IF (ABS (YA-YB).LT.1.0) GO TO 20
C
C ------ COMPUTE SLOPES OF LINE AB AND ITS PERPENDICULAR CD ------
C
      ABSLP = (YA - YB) / (XA - XB)
      CDSLP = (XA - XB) / (YB - YA)
      RETURN
C
C ------ LINE AB IS VERTICAL, DETERMINE PERSPECTIVE ------
C
10    VFLG = 1
      IF (YA.LT.YB) VFLG = -1
      RETURN
C
C ------ LINE AB IS HORIZONTAL, DETERMINE PERSPECTIVE ------
C
20    HFLG = 1
      IF (XA LT.XB) HFLG = -1
      RETURN
      END
```

```
FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


**  NO WARNINGS **  NO ERRORS **   PROGRAM = 00159      COMMON = 00000
```

```
      SUBROUTINE SERCH (PINWT,BFR,DCB,IERR,NUM)
C     ========================================
C
C     ENTER: PINWT - PIN SEARCHING
C            DCB   - DISK CONTROL INFORMATION OF FILE SEARCHING
C     EXIT:  BFR   - RECORD OF PIN SEARCHED
C            NUM   - RECORD NUMBER
C            IERR  - ERROR STATUS OF SEARCH
C                    IERR =   0 => A MATCH FOUND
C                    IERR = -12 => EOF, NO MATCH
C                    IERR <   0 => FMP ERROR
C                    IERR =  12 => STRING ERROR
C
C
      INTEGER DCB(144),BFR(13),PINWT(5)
C
      NUM = 3
      IERR = 0
C
C ------ READ RECORD.  AT EOF? ------
C
10    CALL READF (DCB,IERR,BFR,13,LEN,NUM)
      IF (IERR.LT.0) RETURN
C
      IF (BFR(1).NE.2H   .AND.BFR(2).NE.2H   ) GO TO 20
      IERR = -12
      RETURN
C
C ------ COMPARE PIN NAMES.  M = 0 => A MATCH ------
C
20    M = JSCOM (BFR,1,10,PINWT,1,IERR)
      IF (IERR.LT.0) GO TO 90
      IF (M.EQ.0) RETURN
C
      NUM = NUM + 1
      GO TO 10
C
C ------ REPORT STRING ERRORS ------
C
90    IERR = 99
      RETURN
      END
```

```
FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00092      COMMON = 00000
```

```
89    WRITE (1,189)
189   FORMAT (/"TABLE FILE MODIFICATIONS COMPLETED")
      RETURN
C
C ------ REPORT ERRORS ------
C
90    CALL CLOSE (DCB)
95    CALL ERROR (IERR)
      RETURN
      END
```

```
FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


**  NO WARNINGS **  NO ERRORS **   PROGRAM = 00891      COMMON = 00000
```

```
           WRITE (1,157)
157        FORMAT ("X,Y COORDINATES?")
           READ (1,*) IXC
           READ (1,*) IYC
C
C ------ CALCULATE RELATIVE D,E COORDINATES ------
C
60         BFR(6) = IXC
           BFR(7) = IYC
           CALL ALIGN (IXA,IYA,IXB,IYB)
           CALL GETDE (IXC,IYC,ASD,ASE)
C
65         WRITE (1,140) PINAM,BFR(6),BFR(7),ASD,ASE
           GO TO 80
C
C
C ======      DELETE - FLAG THE RECORD      ======
C ------ PIN NAME IS CHANGED TO ASTERISKS ------
C ------  NUMERIC DATA IS RESET TO NULLS  ------
C
70         DO 75 I=1,5
75         PINAM(I) = 2H**
C
           DO 77 I=6,13
77         BFR(I) = 0
C
C
C ------ WRITE MODIFIED RECORD TO FILE ------
C
80         CALL WRITF (DCB,IERR,BFR,13,NUM)
           IF (IERR.LT.0) GO TO 90
C
C ------ MORE TO MODIFY IN THIS FILE? ------
C
82         WRITE (1,182)
182        FORMAT (/"MORE TO MODIFY IN THIS FILE? _")
           READ (1,122) N
           IF (N.EQ.2HY ) GO TO 20
           IF (N.NE.2HN ) GO TO 82
           CALL CLOSE (DCB)
C
C ------ MODIFY ANOTHER FILE? ------
C
85         WRITE (1,185)
185        FORMAT ("MODIFICATIONS IN ANOTHER FILE? _")
           READ (1,122) N
           IF (N.EQ.2HN ) GO TO 89
           IF (N.NE.2HY ) GO TO 85
C
           WRITE (1,186)
186        FORMAT (/"NAME OF NEXT TABLE FILE? _")
           READ (1,187) FNAME
187        FORMAT (3A2)
           GO TO 10
C
```

```
135   FORMAT (5A2)
C
C ------ LOOK FOR PIN IN TABLE ------
C ------  IF FOUND, CONTINUE   ------
C
      IERR = 0
      CALL SERCH (PINWT,BFR,DCB,IERR,NUM)
      IF (IERR.EQ.-12) GO TO 25
      IF (IERR.NE.0) GO TO 90
C
      IF (M.EQ.2HD ) GO TO 70
C
C
C ====== CHANGE - DISPLAY RECORD AND MAKE CHANGES ======
C ------    PIN NAME?  <CR> OR "N" IF NO CHANGE    ------
C ------ X,Y COORDS?  ANY 2 NEG NUMS IF NO CHANGE ------
C ------  D,E ARE CALCULATED IF X,Y ARE CHANGED    ------
C
      WRITE (1,140) PINAM,BFR(6),BFR(7),ASD,ASE
140   FORMAT (/"  PIN NAME",8X,"X",6X,"Y",9X,"D",7X,"E",
     &//" ",5A2,I9,I7,5X,3A2,2X,3A2)
C
      WRITE (1,142)
142   FORMAT (/"CHANGE PIN NAME? _")
      READ (1,135) PINWT
      IF (PINWT(1).EQ.2HN .OR.PINWT(1).EQ.2H  ) GO TO 46
C
      DO 44 I=1,5
44    PINAM(I) = PINWT(I)
C
46    WRITE (1,146)
146   FORMAT ("CHANGE X,Y COORDINATES?")
      READ (1,*) IXC
      READ (1,*) IYC
      IF (IXC.GE.0) GO TO 60
      GO TO 65
C
C
C ====== ADD - LOOK FOR FIRST AVAILABLE RECORD  ======
C ------     I.E. AT DELETED RECORD OR AT EOF    ------
C ------ INPUT DATA FOR PIN NAME AND ITS COORDS ------
C ------           (D,E) IS CALCULATED          ------
C
50    DO 52 I=1,5
52    PINWT(I) = 2H**
      IERR = 0
      CALL SERCH (PINWT,BFR,DCB,IERR,NUM)
      IF (IERR.EQ.-12) GO TO 55
      IF (IERR) 90,55,90
C
C ------ ADD PIN NAME AND X,Y COORDINATES ------
C
55    WRITE (1,132)
      READ (1,135) PINAM
C
```

```
      SUBROUTINE MODFY (FNAME)
C     ========================
C
C
      COMMON /VALS/ XA,YA,XB,YB,XM,YM,ABSLP,CDSLP,VFLG,HFLG
C
      INTEGER FNAME(3),DCB(144),BFR(13),VFLG,HFLG
      INTEGER PINAM(5),PINWT(5),ASD(3),ASE(3)
C
      EQUIVALENCE (PINAM(1),BFR(1))
      EQUIVALENCE (ASD(1),BFR(8)), (ASE(1),BFR(11))
C
C ------      OPEN HYBRID TABLE FILE      ------
C ------ SET BIT 0 FOR NON-EXCLUSIVE OPEN ------
C ------      SET BIT 1 FOR UPDATING      ------
C
10    CALL OPEN (DCB,IERR,FNAME,3B)
      IF (IERR.LT.0) GO TO 95
C
C ------ READ FIRST TWO RECORDS FOR REF POINTS A AND B ------
C
      CALL READF (DCB,IERR,BFR,13,LEN,1)
      IF (IERR.LT.0) GO TO 90
      IXA = BFR(6)
      IYA = BFR(7)
C
      CALL READF (DCB,IERR,BFR,13,LEN,2)
      IF (IERR.LT.0) GO TO 90
      IXB = BFR(6)
      IYB = BFR(7)
C
C ------ REQUEST MODIFICATION - ADD/DELETE/CHANGE ------
C
20    WRITE (1,120)
120   FORMAT (/"MODIFY - (A)DD, (D)ELETE, OR (C)HANGE? _")
      KNT = 0
      READ (1,122) M
122   FORMAT (A2)
      IF (M.EQ.2HA ) GO TO 50
      IF (M.EQ.2HD .OR.M.EQ.2HC ) GO TO 30
      GO TO 20
C
C ------  ASK FOR PIN NAME IF CHANGING/DELETING   ------
C ------ ALLOW 3 TIMES FOR VALID PIN NAME REQUEST ------
C ------ IF NOT FOUND AFTER 3RD TIME, STOP SEARCH ------
C
25    CALL ERROR (IERR)
30    DO 32 I = 1,5
32    PINWT(I) = 2H
      KNT = KNT + 1
      IF (KNT.GT.3) GO TO 82
C
      WRITE (1,132)
132   FORMAT (/"PIN NAME? _")
      READ (1,135) PINWT
      SUBROUTINE SERCH (FNAME,SLEN,STRG,IERR,BLEN,BFR)
C     ================================================
C
C     ENTER:  FNAME - NAME OF FILE TO BE SEARCHED
C             STRG  - STRING SEARCHING IN FILE
C             SLEN  - LENGTH OF STRING
C             BLEN  - LENGTH OF RECORD IN FILE
C     EXIT:   IERR  - ERROR STATUS OF SEARCH
C                     IERR =   0 => A MATCH FOUND
C                     IERR = -12 => EOF, NO MATCH IN HYBRID FILE
C                     LEN  =  -1 => EOF, NO MATCH IN SPOOL FILE
C                     IERR <   0 => FMP ERROR
C                     IERR =  12 => STRING ERROR
C             BFR   - FILE RECORD OF STRING
C
C
      INTEGER FNAME(3),DCB(144),BFR(40),BLEN,STRG(5),SLEN
C
C ------      OPEN FILE TO BE SEARCHED      ------
C ------ SET BIT 0 FOR NON-EXCLUSIVE OPEN ------
C
      CALL OPEN (DCB,IERR,FNAME,1B)
      IF (IERR.LT.0) RETURN
C
C ------ INITIALIZE FOR SEARCH ------
C
      NUM = 3
      IERR = 0
10    DO 15 I=1,40
15    BFR(I) = 2H
C
C ------ READ RECORD.  AT EOF? ------
C
      CALL READF (DCB,IERR,BFR,BLEN,LEN,NUM)
      IF (IERR.LT.0) GO TO 30
      IF (LEN.EQ.-1.AND.BLEN.EQ.40) GO TO 20
      IF (BFR(1).EQ.2H  .AND.BFR(2).EQ.2H  .AND.BLEN.EQ.13) GO TO 20
C
C ------ COMPARE PIN NAMES.  M = 0 => A MATCH ------
C
      M = JSCOM (STRG,1,SLEN,BFR,1,IERR)
      IF (IERR.LT.0) GO TO 90
      IF (M.EQ.0) GO TO 30
C
      M = JSCOM (STRG,2,SLEN-1,BFR,1,IERR)
      IF (IERR.LT.0) GO TO 90
      IF (M.EQ.0) GO TO 30
C
      NUM = NUM + 1
      GO TO 10
C
C ------ NO MATCH AT EOF/A MATCH, CLOSE FILE AND RETURN ------
20    IERR = -12
30    CALL CLOSE (DCB)
      RETURN
```

```
0053          SUBROUTINE ERROR (IERR)
0054   C      =======================
0055   C
0056   C
0057          IF (IERR.EQ.-12) GO TO 30
0058          IF (IERR.EQ.99) GO TO 20
0059   C
0060          WRITE (1,110) IERR
0061   110    FORMAT (/"**  FMP ERROR ",I5,"  **")
0062          RETURN
0063   C
0064   20     WRITE (1,120)
0065   120    FORMAT (/"**  INVALID CHARACTER(S) IN PIN NAME  **")
0066          RETURN
0067   C
0068   30     WRITE (1,130)
0069   130    FORMAT (/"**  [illegible] NOT FOUND IN TABLE FILE  **")
0070          RETURN
0071          END


  FTN4 COMPILER: HP92060-16092 REV. [illegible]


  **  NO WARNINGS **  NO ERRORS **   PROGRAM = [illegible]
```

```
C
C ------       POSITION REFERENCE POINT B      ------
C ------ STORE DITTO IN RECORD #2, WORDS 8-13 ------
C
        CALL READY (LU,IERR)
        IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
        IF (IEFLG.LT.0) GO TO 95
        WRITE (LU,115)
30      WRITE (1,130)
130     FORMAT (/"POSITION REFERENCE POINT B - ")
C
        ITMP = 0
        IEFLG = 0
33      CALL GETAB (LU,ASX,ASY,IERR)
        IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
        IF (IEFLG) 95,34,33
C
34      CALL READF (DCB,IERR,BFR,13,LEN,2)
        IF (IERR.LT.0) GO TO 90
C
        DO 35 I=1,3
        BFR(I+7) = ASX(I)
35      BFR(I+10) = ASY(I)
        CALL WRITF (DCB,IERR,BFR,13,2)
        IF (IERR.LT.0) GO TO 90
C
C ------ CLOSE FILE AND RETURN ------
C
70      CALL CLOSE (DCB)
        WRITE (1,170)
170     FORMAT (/"INITIALIZATION OF TABLE FILE COMPLETED")
        RETURN
C
C ------ REPORT ERRORS ------
C
90      CALL ERROR (IERR)
        CALL CLEAR (LU,1)
95      CALL CLOSE (DCB)
        RETURN
        END
```

```
FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


**  NO WARNINGS **  NO ERRORS **   PROGRAM = 00543      COMMON = 00000
```

```
FTN4,L
      SUBROUTINE INTAB (FNAME)
C     ========================
C
C
      INTEGER FNAME(3),DCB(144),BFR(13),VFLG,HFLG,ASX(3),ASY(3)
C
C
C ------       OPEN HYBRID TABLE FILE      ------
C ------ SET BIT 0 FOR NON-EXCLUSIVE OPEN ------
C ------       SET BIT 1 FOR UPDATING      ------
C
      CALL OPEN (DCB,IERR,FNAME,3B)
      IF (IERR.LT.0) GO TO 90
C
C ------         SET LU FOR IEEE 488 BUS        ------
C ------ SEND DEVICE CLEAR, SET MODE TO MANUAL ------
C
      LU = 36
      CALL CLEAR (LU,1)
C
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG.LT.0) GO TO 95
      WRITE (LU,117)
117   FORMAT ("M2")
C
C ------          POSITION REFERENCE POINT A          ------
C ------ STORE COORDINATES IN RECORD #1, WORDS 8-13  ------
C ------ SEND MOVE COMMAND TO (0,0) TO ALLOW JOGGING ------
C ------ JOG PROBE TO THE POINT AND REQUEST POSITION ------
C
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG.LT.0) GO TO 95
      WRITE (LU,115)
115   FORMAT ("X00000Y00000")
C
20    WRITE (1,120)
120   FORMAT (/"POSITION REFERENCE POINT A - ")
C
      ITMP = 0
      IEFLG = 0
23    CALL GETAB (LU,ASX,ASY,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG) 95,24,23
C
24    CALL READF (DCB,IERR,BFR,13,LEN,1)
      IF (IERR.LT.0) GO TO 90
C
      DO 25 I=1,3
      BFR(I+7) = ASX(I)
25    BFR(I+10) = ASY(I)
      CALL WRITF (DCB,IERR,BFR,13,1)
      IF (IERR.LT.0) GO TO 90
```

```
C
      CALL CLOSE (DCB)
      WRITE (1,185)
185   FORMAT (/"TABLE FILE DATA ENTRY COMPLETED")
      RETURN
C
C ------ REPORT ERRORS ------
C
90    CALL CLOSE (DCB)
95    CALL ERROR (IERR)
      RETURN
      END


 FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00628      COMMON = 00000
```

```
C
      WRITE (1,150)
150   FORMAT (/"ENTER POINT B COORDINATES")
      READ (1,*) IXB
      READ (1,*) IYB
      BFR(6) = IXB
      BFR(7) = IYB
C
      CALL WRITF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
C
C ------ DETERMINE NEW COORDINATE SYSTEM ------
C
      CALL ALIGN (IXA,IYA,IXB,IYB)
C
C ------         NOW INPUT DATA FOR HYBRID NODE POINT C         ------
C ------ RECORD FORMAT:  WORDS 1-5   PIN NAME IN ASCII          ------
C ------                 WORDS 6-7   ABSOLUTE COORDS IN INTEGER ------
C ------                 WORDS 8-13  RELATIVE COORDS IN ASCII   ------
C
      DO 80 KNT=1,N
C
      WRITE (1,160)
160   FORMAT (/"ENTER PIN NAME AND ITS X,Y COORDINATES")
      READ (1,165) PINAM
165   FORMAT (5A2)
      READ (1,*) IXC
      READ (1,*) IYC
      BFR(6) = IXC
      BFR(7) = IYC
C
C ------ CALCULATE RELATIVE POINT (D,E) ------
C
      CALL GETDE (IXC,IYC,ASD,ASE)
C
C ------ WRITE DATA TO FILE ------
C
      CALL WRITF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
C
      DO 75 I=1,5
75    BFR(I) = 2H
80    CONTINUE
C
C ------ INITIALIZE THE REST OF FILE WITH BLANKS AND ZEROES ------
C
      DO 82 I=6,13
82    BFR(1) = 0
C
      DO 85 I=N+1,N+100
      CALL WRITF (DCB,IERR,BFR)
      IF (IERR.LT.0.AND.IERR.NE.-12) GO TO 90
85    CONTINUE
C
C ------ DONE, CLOSE FILE AND RETURN ------
```

```
      SUBROUTINE ENTER (FNAME)
C     ========================
C
C
      COMMON /VALS/ XA,YA,XB,YB,XM,YM,ABSLP,CDSLP,VFLG,HFLG
C
      INTEGER FNAME(3),DCB(144),SIZE(2),BFR(13)
      INTEGER PINAM(5),ASD(3),ASE(3),VFLG,HFLG
C
      EQUIVALENCE (PINAM(1),BFR(1))
      EQUIVALENCE (ASD(1),BFR(8)), (ASE(1),BFR(11))
C
C ------           CREATE HYBRID TABLE FILE, TYPE 2             ------
C ------ (NUMBER OF NODES + 100) RECORDS/FILE, 13 WORDS/RECORD ------
C ------            STORE ON CARTRIDGE 18 FOR NOW               ------
C
      WRITE (1,110)
110   FORMAT ("NUMBER OF HYBRID NODES IN THE FILE? _")
      READ (1,*) N
C
      SIZE(2) = 13
      SIZE(1) = (SIZE(2) * (N+100)) / 128
      ICR = -18
C
      CALL CREAT (DCB,IERR,FNAME,SIZE,2,0,ICR)
      IF (IERR.LT.0) GO TO 95
C
C ------           INPUT DATA FOR REFERENCE POINT A             ------
C ------ RECORD #1 FORMAT:  WORDS 1-5   "A"                     ------
C ------                    WORDS 6-7   COORDINATES IN INTEGER  ------
C ------                    WORDS 8-13  NULLS (SET IN INTAB)    ------
C
      BFR(1) = 2HA
      DO 20 I=2,5
20    BFR(I) = 2H
C
      WRITE (1,130)
130   FORMAT (/"ENTER POINT A COORDINATES")
      READ (1,*) IXA
      READ (1,*) IYA
      BFR(6) = IXA
      BFR(7) = IYA
C
      BFR(8) = 2H 0
      BFR(11) = 2H 0
      DO 40 I=9,10
      BFR(I) = 2H00
40    BFR(I+3) = 2H00
C
      CALL WRITF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
C
C ------ DITTO FOR REFERENCE POINT B IN RECORD #2 ------
C
      BFR(1) = 2HB
```

```
FTN4,L
      BLOCK DATA VALS
C     ===============
C
C
      COMMON /VALS/ XA,YA,XB,YB,XM,YM,ABSLP,CDSLP,VFLG,HFLG
      INTEGER VFLG,HFLG
      END

  FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)

  **  NO WARNINGS **  NO ERRORS **

 BLOCK COMMON VALS   SIZE =  00018
```

```
      SUBROUTINE GETDE (IXC,IYC,ASD,ASE)
C     ==================================
C
C
      COMMON /VALS/ XA,YA,XB,YB,XM,YM,ABSLP,CDSLP,VFLG,HFLG
C
      INTEGER ASD(3),ASE(3),DTMP(4),ETMP(4),VFLG,HFLG
C
C ------ CALCULATE HYBRID POINT (D,E) ------
C
      XC = FLOAT (IXC)
      YC = FLOAT (IYC)
      CALL CALDE (XC,YC)
C
C ------ CONVERT TO ASCII SNNNNN.0 FORMAT                      ------
C ------                 (------) RETURN THIS TO STORE IN FILE ------
C
      CALL CODE
      WRITE (DTMP,100) XC
      CALL CODE
      WRITE (ETMP,100) YC
100   FORMAT (F8.1)
C
      DO 10 I = 1,3
      ASD(I) = DTMP(I)
10    ASE(I) = ETMP(I)
C
C ------ NOW CHANGE LEADING BLANKS TO ZEROES KEEPING SIGN ------
C
      CALL ZERDE (ASD)
      CALL ZERDE (ASE)
      RETURN
      END
```

```
 FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00095      COMMON = 00000
```

SECTION II

AUTOPROBE UTILITY PROGRAM

REFERENCE: FINAL REPORT SECTION 2, SUBSECTION E.4,......PAGE 2-26

1. HYBRD - UTILITY FUNCTION SELECTION
2. ENTER - CREATE NEW HYBRID NODE FILE
3. INTAB - INITIALIZE A, B REFERENCE POINTS
4. DSPLY - DISPLAY/PRINT HYBRID NODE FILE
5. MODFY - HYBRID NODE FILE EDITOR
6. TEST - AUTOPROBE/NODE FILE INTERACTIVE TEST

```
FTN4,L
      PROGRAM MONPR
C     =============
C
C     SON PROGRAM MONPR IS CALLED BY FATHER ROUTINE MATCH
C     AFTER #1 SON INTPR IS EXECUTED.  MONPR IS CALLED
C     EVERY LOOP OF THE HYBRID TEST UNTIL IT IS COMPLETED.
C     MATCH PASSES HYBRID FILE NAME VIA RMPAR.  MONPR
C     PASSES BACK PROGRAM TERMINATION STATUS VIA PRTN.
C        STATUS > 0 => CONTINUE TESTING HYBRID
C        STATUS < 0 => ABNORMAL TERMINATION, ABORT
C
C
      INTEGER HNAME(3),MNAME(3),BFR(40),PARM(5),SPARM(16)
      INTEGER ASD(3),ASE(3),STRGP(3),STRGR(4),STRG(5)
C
      EQUIVALENCE (ASD(1),BFR(8)), (ASE(1),BFR(11))
C
      DATA MNAME /2HSP,2HLH,2HBD/
      DATA STRGP /2H P,2HRO,2HBE/, STRGR /2H R,2HEP,2HRO,2HBE/
      DATA SPARM /0,0,2HSP,2HLH,2HBD,0,0,00B,423B,10,0,0,0,0,0,0/
C
C ------ RETRIEVE HYBRID TABLE FILE NAME ------
C
      CALL RMPAR (PARM)
      DO 10 I=1,3
10    HNAME(I) = PARM(I)
C
C ------ SEARCH FOR "PROBE" MESSAGE IN SPOOL FILE ------
C
      CALL SERCH (MNAME,6,STRGP,IERR,40,BFR)
      IF (IERR.EQ.-12) GO TO 20
      IF (IERR.NE.0) GO TO 90
      GO TO 30
C
C ------ SEARCH FOR "REPROBE" MESSAGE IN SPOOL FILE ------
C
20    CALL SERCH (MNAME,8,STRGR,IERR,40,BFR)
      IF (IERR.NE.0) GO TO 90
C
C ------ "PROBE"/"REPROBE" FOUND, LOOK FOR PIN NAME ------
C ------          I.E. LOOK FOR A "U" IN MSG         ------
C
30    DO 35 I=1,40
      IU1 = IAND (BFR(I),177400B) + 40B
      IF (IU1.EQ.2HU ) GO TO 40
      IU2 = IAND (BFR(I),377B) + 20000B
      IF (IU2.EQ.2H U) GO TO 40
      IF (BFR(I).EQ.2HGN.OR.BFR(I).EQ.2H G) GO TO 40
      IF (BFR(I).EQ.2HVC.OR.BFR(I).EQ.2H V) GO TO 40
35    CONTINUE
      IERR = 98
      GO TO 90
C
C ------ PIN NAME FOUND, SEARCH IN HYBRID TABLE FILE ------
```

```
PAGE 0002  MONPK  8:55 PM  MON., 14  DEC., 1981

C
40    DO 45 J=1,5
45    STRG(J) = BFR(I+J-1)
C
      CALL SERCH (HNAME,10,STRG,IERR,13,BFR)
      IF (IERR.NE.0) GO TO 90
C
C ------ FIRST RECREATE LINK BETWEEN LU #63 AND FILE SPLHBD ------
C
      CALL SPOPN (SPARM,ISLU)
      IERR = 97
      IF (ISLU.LT.0) GO TO 90
      IF (ISLU.NE.63) GO TO 90
C
C ------ NAME FOUND IN TABLE, SEND PIN COORDINATES OVER 488 BUS ------
C ------    FORMAT:  D (+/-) (COORD) E (+/-) (COORD) (CR) (LF)    ------
C
      LU = 36
C
      ITMP = 0
      IEFLG = 0
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG.LT.0) GO TO 95
C
      ITMP = 0
      IEFLG = 0
60    ICM1 = 2HD
      ICM2 = 2HE
      WRITE (LU,160) ICM1,ASD,ICM2,ASE
160   FORMAT (2(A2,3A2))
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IEFLG,ITMP,IEFLG)
      IF (IEFLG) 95,70,60
C
70    PARM(1) = 1
C
C ------ MONITORING DONE, SEND PROGRAM STATUS TO PAFA ------
C
80    CALL PRTN (PARM)
      CALL EXEC (6)
C
C ------ REPORT ERRORS ------
C
90    CALL ERROR (IERR)
      CALL CLEAR (LU,1)
C
95    PARM(1) = -1
      GO TO 80
      END

FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)
```

```
      SUBROUTINE GETAB (LU,ASX,ASY,IERR)
C     =================================
C
C
      INTEGER MSG(7),ASX(3),ASY(3)
C
C ------     REQUEST AND RECEIVE COORDINATES FROM BUS      ------
C ------ FORMAT SENDING:    SP <CR> <LF>                   ------
C ------ FORMAT RECEIVING: X <COORD> Y <COORD> <CR> <LF> ------
C
      CALL READY (LU,IERR)
      IF (IERR.NE.0) RETURN
      WRITE (LU,100)
100   FORMAT ("SP")
C
      READ (LU,110) MSG
110   FORMAT (7A2)
C
C ------ CONVERT TO CHOSEN ASCII FORMAT AND RETURN ------
C
      DO 20 I=1,3
      ASX(I) = MSG(I)
20    ASY(I) = MSG(I+3)
C
      ASX(1) = IAND (ASX(1),377B) + 20000B
      ASY(1) = IAND (ASY(1),377B) + 20000B
C
      IERR = 0
      RETURN
      END
```

```
 FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00107      COMMON = 00000
```

```
      SUBROUTINE TEST (FNAME)
C     ======================
C
C
      INTEGER FNAME(3),DCB(144),BFR(13),MSG(18)
      INTEGER PINAM(5),ASD(3),ASE(3),AASD(3),AASE(3),BASD(3),BASE(3)
C
      EQUIVALENCE (PINAM(1),BFR(1))
      EQUIVALENCE (ASD(1),BFR(8)), (ASE(1),BFR(11))
C
C ------ PREP FOR TEST - DEVICE CLEAR ------
C
      LU = 36
      CALL CLEAR (LU,1)
110   FORMAT (A2)
115   FORMAT (18A2)
C
C ------        OPEN HYBRID TABLE FILE       ------
C ------ SET BIT 0 FOR NON-EXCLUSIVE OPEN ------
C
      CALL OPEN (DCB,IERR,FNAME,1B)
      IF (IERR.LT.0) GO TO 90
C
C ------ RETRIEVE POINTS A AND B THEN SEND COORDINATES ------
C ------     FORMAT: AX <COORD> AY <COORD> <CR> <LF>     ------
C ------     FORMAT: BX <COORD> BY <COORD> <CR> <LF>     ------
C
      CALL READF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
      DO 16 I=1,3
      AASD(I) = ASD(I)
16    AASE(I) = ASE(I)
C
      CALL READF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
      DO 17 I=1,3
      BASD(I) = ASD(I)
17    BASE(I) = ASE(I)
C
      ITMP = 0
      IEFLG = 0
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG.LT.0) GO TO 95
18    ICM1 = 2HAX
      ICM2 = 2HAY
      WRITE (LU,118) ICM1,AASD,ICM2,AASE
118   FORMAT (2(A2,3A2))
C
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG) 95,19,18
C
19    ITMP = 0
      IEFLG = 0
```

```
20    ICM1 = 2HBX
      ICM2 = 2HBY
      WRITE (LU,118) ICM1,BASD,ICM2,BASE
C
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG) 95,21,20
C
C ------ LOAD HYBRID AND SET TEST MODE ------
C
21    ITMP = 0
      IEFLG = 0
22    ICMD = 2HLD
      WRITE (LU,110) ICMD
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG) 95,40,22
C
C ====== PRESENT MENU OF COMMANDS ======
C
40    ITMP = 0
      IEFLG = 0
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG) 95,400,480
C
400   WRITE (1,1400)
1400  FORMAT (//8X,"KEYBOARD TEST PROBE COMMANDS",
     &//"IN",14X,"INITIALIZE PROBE",
     &/"AXNNNNNAYNNNNN  SEND REFERENCE POINT A",
     &/"BXNNNNNBYNNNNN  SEND REFERENCE POINT B",
     &/"LD",14X,"LOAD HYBRID",/"UL",14X,"UNLOAD HYBRID",
     &/"M0",14X,"SET MODE TO AUTOMATIC",
     &/"M1",14X,"SET MODE TO MANUAL",/"M2",14X,"SET MODE TO TEST",
     &/"XNNNNNYNNNNN    GO TO POSITION (X,Y)",
     &/"DSNNNNNESNNNNN  GO TO POSITION (D,E)",
     &/"HO",14X,"GO TO HOME POSITION",
     &/"UP",14X,"RAISE PROBE",/"DN",14X,"LOWER PROBE",
     &/"MS (MESSAGE)    SEND A MESSAGE",
     &/"??",14X,"REQUEST STATUS",
     &/"SP",14X,"REQUEST (X,Y) POSITION INFORMATION",
     &/"SD",14X,"REQUEST (D,E) POSITION INFORMATION",
     &/"SE",14X,"REQUEST ERROR CODE",
     &/"FT",14X,"TEST HYBRID FILE SEQUENTIALLY",
     &/"EX",14X,"EXIT KEYBOARD TEST"/)
C
C ------ ENTER A COMMAND ------
C
410   WRITE (1,1410)
1410  FORMAT (11X,"ENTER A COMMAND: _")
      READ (1,115) MSG
C
415   ICMD = IAND (MSG(1),177400B) + 40B
      IF (MSG(1).EQ.2HUP.OR.MSG(1).EQ.2HDN.OR.MSG(1).EQ.2HHO) GOTO 420
      IF (MSG(1).EQ.2HM0.OR.MSG(1).EQ.2HM1.OR.MSG(1).EQ.2HM2) GOTO 420
      IF (MSG(1).EQ.2HLD.OR.MSG(1).EQ.2HUL) GO TO 420
      IF (MSG(1).EQ.2HMS) GO TO 435
      IF (ICMD.EQ.2HA .OR.ICMD.EQ.2HB .OR.ICMD.EQ.2HD ) GO TO 432
      IF (ICMD.EQ.2HX ) GO TO 430
C
      ICMD = MSG(1)
      IF (ICMD.EQ.2H??.OR.ICMD.EQ.2HSE) GO TO 440
      IF (ICMD.EQ.2HSP.OR.ICMD.EQ.2HSD) GO TO 440
C
      IF (MSG(1).EQ.2HFT) GO TO 50
      IF (MSG(1).EQ.2HIN) GO TO 437
      IF (MSG(1).EQ.2HEX) GO TO 80
      GO TO 410
C
C ------ EXECUTE PROBE MOVE/MESSAGE/INITIALIZE COMMAND -----
C
420   WRITE (LU,110) MSG(1)
      GO TO 480
C
430   WRITE (LU,1430) (MSG(I),I=1,6)
1430  FORMAT (6A2)
      GO TO 480
C
432   WRITE (LU,1432) (MSG(I),I=1,8)
1432  FORMAT (8A2)
      GO TO 480
C
435   WRITE (LU,1435) (MSG(I),I=1,17)
1435  FORMAT (17A2)
      GO TO 480
C
437   CALL CLEAR (LU,1)
      GO TO 480
C
C ------ EXECUTE STATUS/POSITION INFORMATION REQUEST ------
C ------    DELAY 250 MILLISECONDS FOR SD COMMAND    ------
C
440   WRITE (LU,110) ICMD
      IF (ICMD.EQ.2HSD) CALL EXEC (12,0,1,0,-25)
      READ (LU,115) MSG
C
      IF (ICMD.EQ.2H??) GO TO 470
      IF (ICMD.EQ.2HSP) GO TO 460
      IF (ICMD.EQ.2HSD) GO TO 465
C
      MSG(1) = MSG(1)/256
      WRITE (1,1450) MSG(1)
1450  FORMAT (/"THE ERROR CODE IS ",I5)
      GO TO 480
C
460   MSG(1) = IAND (MSG(1),377B) + 24000B
      MSG(4) = IAND (MSG(4),377B) + 26000B
      WRITE (1,1460) (MSG(I),I=1,6)
1460  FORMAT (/"THE (X,Y) POSITION IS ",6A2,")")
      GO TO 480
```

```
C
465    MSG(1) = IAND (MSG(1),377B) + 24000B
       MSG(4) = IAND (MSG(4),177400B) + 54B
       WRITE (1,1465) (MSG(I),I=1,7)
1465   FORMAT (/"THE (D,E) POSITION IS ",7A2,")")
       GO TO 480
C
470    IST = 2HUP
       IF (IAND (MSG(1),20000B).NE.0) IST = 2HDN
       WRITE (1,1470) IST
1470   FORMAT (/"PROBER POSITION?   ",A2)
       IST = 2HNO
       IF (IAND (MSG(1),10000B).NE.0) IST = 2HY
       WRITE (1,1472) IST
1472   FORMAT ("PROBER BUSY?        ",A2)
       IST = 2HY
       IF (IAND (MSG(1),4000B).NE.0) IST = 2HNO
       WRITE (1,1474) IST
1474   FORMAT ("PROBER ONLINE?      ",A2)
       IST = 2HNO
       IF (IAND (MSG(1),2000B).NE.0) IST = 2HY
       WRITE (1,1476) IST
1476   FORMAT ("ERROR CONDITION?    ",A2)
       IST = 2HAU
       IF (IAND (MSG(1),1400B).EQ.0) GO TO 478
       IST = 2HMN
       IF (IAND (MSG(1),1000B).EQ.0) GO TO 478
       IST = 2HTS
       IF (IAND (MSG(1),400B).EQ.0) GO TO 478
       IST = 2HID
478    WRITE (1,1478) IST
1478   FORMAT ("PROBER MODE?        ",A2)
C
C ------ REINITIALIZE, THEN CONTINUE WITH TESTING ------
C
480    WRITE (1,1480)
1480   FORMAT (/"PRESS RETURN TO CONTINUE _")
       READ (1,110) N
C
       DO 490 I=1,18
490    MSG(I) = 2H
       GO TO 40
C
C ------   TEST EACH RECORD OF FILE SEQUENTIALLY    ------
C ------ NOW READ A RECORD AND RETRIEVE POINT (D,E) ------
C ------   SKIP DELETED RECORDS.  CHECK FOR EOF.    ------
C
50     ICMD = 2H??
       WRITE (LU,110) ICMD
       READ (LU,115) MSG
       IF (IAND (MSG(1),1400B).EQ.1000B) GO TO 510
C
       WRITE (1,1500)
1500   FORMAT (/"FIRST, SET MODE TO TEST")
       GO TO 480
```

```
C
510   CALL READF (DCB,IERR,BFR)
      IF (IERR.LT.0) GO TO 90
      IF (BFR(1).EQ.2H**.AND.BFR(2).EQ.2H**) GO TO 50
      IF (BFR(1).EQ.2H  .AND.BFR(2).EQ.2H  ) GO TO 40
C
C ------ DISPLAY PIN NAME, THEN CONTINUE ------
C
      WRITE (1,1520) PINAM
1520  FORMAT (//"THE NEXT PIN IS:  ",5A2,
     &/"PRESS 'ENTER' TO CONTINUE")
C
C ------        MOVE PROBER TO HYBRID POSITION (D,E)        ------
C ------ FORMAT: D <+/-> <COORD> E <+/-> <COORD> <CR> <LF> ------
C
      IF (IAND (ASD(1),177400B).EQ.20000B)
     &          ASD(1) = IAND (ASD(1),377B) + 25400B
      IF (IAND (ASE(1),177400B).EQ.20000B)
     &          ASE(1) = IAND (ASE(1),377B) + 25400B
C
      ITMP = 0
      IEFLG = 0
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG.LT.0) GO TO 95
530   ICM1 = 2HD
      ICM2 = 2HE
      WRITE (LU,118) ICM1,ASD,ICM2,ASE
C
      CALL READY (LU,IERR)
      IF (IERR.NE.0) CALL BEROR (IERR,ITMP,IEFLG)
      IF (IEFLG) 95,535,530
535   ICMD = 2HSD
      WRITE (LU,110) ICMD
      CALL EXEC (12,0,1,0,-25)
      READ (LU,115) MSG
C
C ------ NOTE THE FILE AND PROBER POSITIONS ------
C
      MSG(1) = IAND (MSG(1),377B) + 24000B
      MSG(4) = IAND (MSG(4),177400B) + 54B
C
      WRITE (1,1540) PINAM,ASD,ASE,(MSG(I),I=1,7)
1540  FORMAT (/"THE PIN IS:  ",5A2,
     &/"CALCULATED POSITION IS:  (",3A2,",",3A2,")",
     &/"THE ACTUAL POSITION IS:  ",7A2,")")
C
      CALL EXEC (12,0,2,0,-3)
      GO TO 510
C
C ------ DONE, CLOSE FILE AND/OR REINITIALIZE PROBER ------
C
80    CALL CLOSE (DCB)
      WRITE (1,180)
180   FORMAT (/"PROBER TEST COMPLETED")
```

```
        RETURN
C
C ------ REPORT ERRORS ------
C
90      CALL ERROR (IERR)
        CALL CLEAR (LU,1)
95      CALL CLOSE (DCB)
        RETURN
        END


 FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 02031      COMMON = 00000
```

```
      SUBROUTINE READY (LU,IERR)
C     ==========================
C
C
      INTEGER MSG(2)
C
C ----- DELAY 500 MILLISECONDS ------
C
      IRESL = 1
      IMULT = 0
      IOFST = -50
10    CALL EXEC (12,0,IRESL,IMULT,IOFST)
C
C ----- READY FOR DATA?  CHECK "BUSY" AND "ERROR" BITS ------
C
      ICMD = 2H??
      WRITE (LU,100) ICMD
100   FORMAT (A2)
      READ (LU,110) MSG
110   FORMAT (2A2)
      IF (IAND (MSG(1),10000B).NE.0) GO TO 10
      IF (IAND (MSG(1),2000B).NE.0) GO TO 20
C
      IERR = 0
      RETURN
C
20    ICMD = 2HSE
      WRITE (LU,100) ICMD
      READ (LU,110) MSG
      IERR = MSG(1)
      RETURN
      END


 FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00104      COMMON = 00000
```

```
      SUBROUTINE BEROR (IERRC,IERRP,IEFLG)
C     ====================================
C
C
C ------ IS ERROR FATAL OR NON-FATAL? ------
C
      IF (IAND (IERRC,100000B).NE.0) GO TO 30
C
C ------ NON-FATAL, IS IT THE SAME AS PREVIOUS CODE? ------
C
      IERRC = IERRC/256
      IF (IERRC.NE.IERRP) GO TO 10
      IEFLG = IEFLG + 1
      GO TO 20
C
10    IEFLG = 1
      IERRP = IERRC
C
C ------ PRINT NON-FATAL ERROR MESSAGE ------
C
20    WRITE (1,120) IERRC
120   FORMAT (/"*** NON-FATAL BUS ERROR ",I5," ***")
C
C ------ SAME NON-FATAL ERROR 3 TIMES?  IF YES, ABORT ------
C
      IF (IEFLG.EQ.3) GO TO 40
      PAUSE
      RETURN
C
C ------ FATAL, PRINT FATAL ERROR MESSAGE AND ABORT ------
C
30    IERRC = IERRC/256
      WRITE (1,130) IERRC
130   FORMAT (/"*** FATAL BUS ERROR ",I5," ***")
C
40    IEFLG = -99
      CALL CLEAR (LU,1)
      PAUSE
      RETURN
      END


FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


**  NO WARNINGS **  NO ERRORS **   PROGRAM = 00125      COMMON = 00000
```

```
      SUBROUTINE CALDE (XC,YC)
C     ========================
C
C
      COMMON /VALS/ XA,YA,XB,YB,XM,YM,ABSLP,CDSLP,VFLG,HFLG
C
      INTEGER VFLG,HFLG
C
C ------ CHANGE POINT TO NEW COORD SYSTEM USING MIDPOINT M ------
C
      XC = XC - XM
      YC = YC - YM
C
C ------ CHECK IF VERTICAL/HORIZONTAL REFERENCE ------
C
      IF (VFLG) 30,10,40
10    IF (HFLG) 50,15,60
C
C ------ CALCULATE VALUES FOR COORDINATES D AND E ------
C
15    ZC = YC - (CDSLP * XC)
      D = ABS (ZC / (SQRT ((CDSLP**2) + 1)))
C
      E3 = SQRT ((ABSLP**2) + 1)
      E = ABS ((YC - (ABSLP * XC)) / E3)
C
C ------ CALCULATE SIGNS FOR COORDINATES D AND E ------
C
      XF = ZC / (ABSLP - CDSLP)
      YF = ABSLP * XF
C
      R1 = SQRT (((XF-XA) ** 2) + ((YA-YF) ** 2))
      R2 = SQRT (((XB-XF) ** 2) + ((YF-YB) ** 2))
C
      D = D + 0.5
      IF (R2.LT.R1) D = -D
C
      E = E + 0.5
      K = 0
      IF (YA-YB.GT.0.0) K = 4
      IF (ABSLP.GT.0.0) K = K + 2
      IF (YC.GT.YF) K = K + 1
      IF (K.EQ.1.OR.K.EQ.2.OR.K.EQ.4.OR.K.EQ.7) E = -E
C
C ------ CALCULATIONS COMPLETED, RETURN D AND E ------
C
20    XC = D
      YC = E
      RETURN
C
C ------ VERTICAL REFERENCE, DETERMINE SIGNS AND VALUES ------
C
30    D = -YC
      E = -XC
      GO TO 20
```

```
                             *
                             *  DATA INPUT INTERRUPT - WHEN THE BI (BYTE I
                             *  THE END (END OR IDENTIFY) BIT GETS SET, TH
                             *  IS VECTORED TO.  THIS ROUTINE WORKS OFF OF
                             *  QUEUE AND WILL ACCEPT CHARACTERS UNTIL THE
                             *
0104 B6   E702      A DLSTN  LDA    HPREG2
0107 85   04        A        BITA   #LACBIT   ;LISTEN ACTIVE STATE?
0109 26   07   0112          BNE    DLST10    ;YES
                             *
                             *  ERROR -  NOT A LISTENER
                             *
010B C6   03        A        LDB    #NOLSTN
010D D7   AB        A        STB    BUSERR
010F 7E   018E      P        JMP    I3EXIT
                             *
0112 F6   E707      A DLST10 LDB    HPREG7    ;GET CHARACTER
0115 96   B1        A        LDA    XFRST     ;CURRENT TRANSMISSION
                             *
0117 81   FF        A        CMPA   #ACTMOD   ;IN ACTIVE STATE?
0119 26   17   0132          BNE    DLST30    ;NO
                             *
011B C1   3F        A        CMPB   #STCHAR   ;IS IT STATUS CHARACTE
011D 26   0D   012C          BNE    DLST20    ;NO
                             *
011F 96   AA        A        LDA    REG0SV
0121 85   02        A        BITA   #ENDBIT   ;IS THISLAST BYTE OF M
0123 26   15   013A          BNE    DLST50    ;YES STORE CHAR ANYWAY
                             *
0125 86   00        A        LDA    #ALRMOD   ;YES, SET TO ALARM MOD
0127 97   B1        A        STA    XFRST
0129 7E   018E      P        JMP    I3EXIT
                             *
012C 86   02        A DLST20 LDA    #DACMOD   ;DEACTIVE STATUS ALARM
012E 97   B1        A        STA    XFRST
0130 20   08   013A          BRA    DLST50
                             *
0132 81   00        A DLST30 CMPA   #ALRMOD   ;IN ALARM MODE?
0134 27   3A   0170          BEQ    DLST70    ;YES
                             *
0136 81   01        A        CMPA   #IGNMOD   ;IGNORE CHAR?
0138 27   0F   0149          BEQ    DLST60    ;YES
                             *
013A 8E   045E      A DLST50 LDX    #INBUF    ;POINTER TO INPUT BUF
013D BD   0000      A        JSR    PUTCHR    ;GET CHAR FROM Q
0140 24   07   0149          BCC    DLST60    ;NO ERRORS
                             *
                             *  ERROR - INPUT QUEUE IS FULL
                             *
0142 C6   02        A DLST55 LDB    #QUEFUL
0144 D7   AB        A        STB    BUSERR
0146 7E   018E      P        JMP    I3EXIT
                             *
                             *  CHECK FOR END OR IDENTIFY TRANSMISSION
                             *
0149 96   AA        A DLST60 LDA    REG0SV
014B 85   02        A        BITA   #ENDBIT   ;WAS THIS LAST BYTE?
014D 27   1E   016D          BEQ    DLST65    ;NO
```

```
                                *
                                *  COMMAND INTERRUPT - LISTEN FOR COMMAND ONL
                                *     UPON INTERRUPT OF THE CMD BIT SET OF THE
                                *     INTERRUPT MASK REGISTER, THIS ROUTINE WI
                                *     VECTORED TO BY THE IRQ BUS HANDLER. THE
                                *     PURPOSE OF THE ROUTINE IS TO DETERMINE W
                                *     COMMAND IS REQUESTED AND SET THE APPROPR
                                *     VARIABLES AND FLAGS.
                                *
  00C2 86   E701      A CLSTN  LDA    HPREG1
  00C5 85   08        A        BITA   #RLCBIT    ;WAS IT REM/LOC CHANGE
  00C7 27   0D   00D6          BEQ    CLST20     ;NO
                                *
                                *  CHANGE IN REMOTE/LOCAL STATE HAS OCCURED
                                *
P 00C9 0F   B0        A        CLR    OPMODE     ;SET TO LOCAL
P 00CB 85   40        A        BITA   #REMBIT    ;IS REMOTE ENABLED?
P 00CD 1027 00BD 018E          LBEQ   I3EXIT     ;NO
                                *
P 00D1 03   B0        A        COM    OPMODE     ;SET TO REMOTE
P 00D3 7E   018E      P        JMP    I3EXIT
                                *
                                *  CHECK FOR SERIAL POLL ACTIVE STATE
                                *
P 00D6 85   04        A CLST20 BITA   #SPABIT    ;IS SPAS BIT SET?
P 00D8 27   06   00E0          BEQ    CLST40     ;NO
                                *
P 00DA 7F   E705      A        CLR    HPREG5     ;NEVER US FOR SERIAL P
P 00DD 16   00AE 018E          LBRA   I3EXIT
                                *
                                *  CHECK FOR DEVICE CLEAR ACTIVE STATE
                                *
P 00E0 85   02        A CLST40 BITA   #DCABIT    ;IS DCAS BIT SET?
P 00E2 27   08   00EC          BEQ    CLST60     ;NO
                                *
P 00E4 86   10        A        LDA    #$10
P 00E6 B7   E703      A        STA    HPREG3     ;RELEASE DAC HOLDOFF
P 00E9 7E   0000      A        JMP    INTDEV     ;INIT DEVICE
                                *
P 00EC 85   01        A CLST60 BITA   #UUCBIT    ;IS IT UNDEF CMD?
P 00EE 26   08   00F8          BNE    CLST70     ;YES
P 00F0 85   80        A        BITA   #UACBIT    ;ADDRESS CMD UNDEF?
P 00F2 26   04   00F8          BNE    CLST70     ;YES
                                *
                                *  UNKNOWN CMD HAS BEEN RECEIVED
                                *
P 00F4 86   05        A        LDA    #UKINTR
P 00F6 20   07   00FF          BRA    CLST80
                                *
                                *  UNDEFINED UNIVERSAL COMMAND RECEIVED
                                *
P 00F8 86   10        A CLST70 LDA    #$10
P 00FA B7   E703      A        STA    HPREG3     ;RELEASE DAC HOLDOFF
P 00FD 86   04        A        LDA    #BDUCMD
                                *
P 00FF 97   AB        A CLST80 STA    BUSERR
P 0101 7E   018E      P        JMP    I3EXIT
                                *
```

```
0093 25    09    009E          BCS     TALK75    ;THIS IS A PROBLEM????
                          *
0095 C1    0A       A          CMPB    #STRTRM   ;END OF MESSAGE?
0097 27    07    00A0          BEQ     TALK80    ;YES
                          *
0099 F7    E707     A          STB     HPREG7    ;NO,SEND OUT DATA BYTE
009C 20    21    00BF          BRA     TALKRT
                          *
                          *  TRANSFER IS NOW COMPLETE
                          *
009E C6    0A       A TALK75 LDB     #STRTRM   ;FORCE END OF STRING
00A0 86    20       A TALK80 LDA     #$20      ;SET EOI LINE
00A2 B7    E703     A          STA     HPREG3    ;TO HOLD OFF HANDSHAKE
                          *
00A5 12                        NOP               ;MAY BE USED FOR TOGGL
00A6 12                        NOP               ;OF HPREG0
00A7 12                        NOP
00A8 12                        NOP
00A9 86    BF       A          LDA     #$BF      ;TURN OFF BO BIT
00AB B7    E700     A          STA     HPREG0
00AE F7    E707     A          STB     HPREG7    ;SEND LAST CHARACTER
                          *
00B1 0F    AD       A          CLR     XINPRG    ;SET TO IDLE
00B3 BE    046C     A          LDX     OUTBCF+6  ;INIT BUFFER
00B6 BF    0468     A          STX     OUTBCF+2
00B9 BF    0466     A          STX     OUTBCF
00BC 0F    AE       A          CLR     OUTCNT    ;Q EMPTY
00BE 3B                        RTI
                          *
00BF 7E    018E     P TALKRT JMP     I3EXIT
```

```
'7                              *
'8                              *   TALKER INTERRUPT - THIS ROUTINE IS TRIGGE
'9                              *    THE BYTE OUT 'BO' BIT OF THE INTERRUPT S
30                              *    REGISTER (HPREG0) GETS SET. EAC TIME THI
31                              *    BIT GETS SET, A SINGLE BYTE WILL BE SENT
32                              *    CONTROLLER.  CURRENT PHILOSOPHY IS IF A
33                              *    IS IN PROGRRESS AND THE STATUS TASK FLAG
34                              *    (STTASK), ABORT THE CURRENT TRANSMISSION
35                              *    STATUS.
36                              *
37P 004B B6   E702     A TALKER LDA    HPREG2    ;READ ADDRESS STAT REG
38P 004E 85   08       A        BITA   #TACBIT   ;IN TALKER ACTIVE STAT
39P 0050 26   07   0059         BNE    TALK10    ;YES
90                              *
91                              *  ERROR - NOT CURRENTLY ADDRESSED TO TALK
92                              *
93P 0052 C6   06       A        LDB    #NOTALK
94P 0054 D7   AB       A        STB    BUSERR
95P 0056 7E   018E     P        JMP    I3EXIT
96                              *
97P 0059 0D   AC       A TALK10 TST    STTASK    ;STATUS REQUIRED?
98P 005B 27   25   0082         BEQ    TALK50    ;NO
99                              *
:00                             *  STATUS REQUESTED OF PROBE
:01                             *
:02P 005D 0F  AC       A        CLR    STTASK    ;RESET STATUS ENABLE
'03P 005F 0D  AD       A        TST    XINPRG    ;TRANSFER IN PROGRESS
)4P 0061 26   02   0065         BNE    TALK20    ;YES
:05                             *
:06P 0063 03  AD       A        COM    XINPRG    ;SET TRANSFER IN PROGR
:07                             *
:08P 0065 8E  0466     A TALK20 LDX    #OUTBCF   ;PTR TO BCF'
:09P 0068 CC  04D4     A        LDD    #OUTBUF   ;BEG OF BUF
:10P 006B 108E 0539    A        LDY    #OUTEND   ;END OF BUF
:11P 006F BD  0000     A        JSR    INTBCF    ;INIT BCF FIELD
:12                             *
:13P 0072 BD  0000     A        JSR    FORMST    ;FORM STATUS BYTE
:14P 0075 8E  0466     A        LDX    #OUTBCF   ;PTR TO OUTPUT BCF
:15P 0078 1F  89       A        TFR    A,B
:16P 007A BD  0000     A        JSR    PUTCHR    ;SAVE STATUS BYTE
:17P 007D BD  0000     A        JSR    OTCRLF    ;OUTPUT CR/LF
:18P 0080 20  0B   008D         BRA    TALK70
:19                             *
:20                             *  CHECK FOR DATA TO SEND
:21                             *
:22P 0082 0D  AD       A TALK50 TST    XINPRG    ;IS TRANSFER IN PROGRE
:23P 0084 26  07   008D         BNE    TALK70    ;YES SEND NEXT BYTE
:24                             *
:25P 0086 0D  AE       A        TST    OUTCNT    ;ANY MESSAGES WAITING?
:26P 0088 26  01   008B         BNE    TALK60    ;YES
:27P 008A 3B                    RTI
:28                             *
'29P 008B 03  AD       A TALK60 COM    XINPRG    ;SET TRANSFER TO IN PR
 30                             *
:31                             *  SEND OUT THE NEXT DATA BYTE
:32                             *
:33P 008D 8E  0466     A TALK70 LDX    #OUTBCF
:34P 0090 BD  0000     A        JSR    GETCHR
```

```
                                    *
                                    *   INITIALIZATION PROCESS TO SET UP THE IEEE
                                    *   HPIB INTO THE INTERRUPT DRIVEN MODE.
                                    *
 P 0031 B6    E704      A INTI3E LDA      HPREG4     ;READ THE ADDRESS SWIT
 P 0034 84    1F        A        ANDA     #$1F       ;MASK THE BASE ADDRESS
 P 0036 B7    E704      A        STA      HPREG4     ;INTERP ON LISTEN TALK
 ,                                  *
 P 0039 86    80        A        LDA      #$80       ;SET RESET BIT
IP 003B B7    E703      A        STA      HPREG3
'P 003E 4F                       CLRA
IP 003F B7    E703      A        STA      HPREG3     ;RESET 488 CIP
 P 0042 C6    FF        A        LDB      #INTMOD    ;CURRENT INTERRUPT
2P 0044 F7    E700      A        STB      HPREG0     ;CONFIGURATION
 |                                  *
IP 0047 B7    E702      A        STA      HPREG2     ;NO SPECIAL FUNC
5P 004A 39                       RTS
```

```
 119                               *
  20                               *  IEEE-68488 INTERRUPT PROCESSOR
  21                               *
 122                               *    THIS SYSTEM IS CONFIGURED SUCH THAT WHEN
 123                               *   68488 BUS INTERRUPT IS GENERATED BY A CON
 124                               *   THE HARDWARE IS 'HARDWIRED' TO VECTOR TO
 125                               *   WHERE IT WILL BE DETERMINED THE VALIDITY
 126                               *   THE INTERRUPT AND DIRECT IT TO THE APPROP
 127                               *   SUB-HANDLER.
 128                               *
 129P 0000 B6   E700      A IRQI3E LDA     HPREG0    ;READ INTERRUPT REG
 130P 0003 2A   29   002E          BPL     IRQNOT    ;TRY FOR KEYBOARD
 131                               *
 132P 0005 97   AA        A        STA     REG0SV    ;SAVE COMMAND INFO
 133                               *
 134P 0007 85   01        A        BITA    #BIBIT    ;IS IT BI?
 135P 0009 1026 00F7 0104          LBNE    DLSTN     ;YES
 136                               *
 137P 000D 85   02        A        BITA    #ENDBIT   ;IS IT END BIT?
 138P 000F 1026 00F1 0104          LBNE    DLSTN     ;YES
 139                               *
 140P 0013 85   04        A        BITA    #CMDBIT   ;IS IT CMD BIT
0141P 0015 1026 00A9 00C2          LBNE    CLSTN     ;YES
0142                               *
0143P 0019 85   40        A        BITA    #BOBIT    ;IS IT BO BIT?
0144P 001B 26   2E   004B          BNE     TALKER    ;YES
  45                               *
  46P 001D 85   20        A        BITA    #GETBIT   ;GROUP EXEC TRIG?
 147P 001F 27   08   0029          BEQ     IRQERR    ;NO
0148                               *
0149P 0021 86   10        A        LDA     #$10
0150P 0023 B7   E703      A        STA     HPREG3    ;RELEASE DAC HOLDOFF
0151P 0026 7E   018E      P        JMP     I3EXIT
0152                               *
0153P 0029 C6   01        A IRQERR LDB     #BADIRQ   ;ILLEGAL INTERRUPT
0154P 002B D7   AB        A        STB     BUSERR
0155P 002D 3B                      RTI
0156                               *
0157P 002E 7E   0000      A IRQNOT JMP     KINT      ;KEY PROCESSOR
```

```
*
***********
*
*   NAME:   IEEE INTERFACE MODULE
*
*   FUNCTION: THIS MODULE WILL HANDLE ALL
*             COMMUNICATIONS BETWEEN THE DTS-
*             SYSTEM AND THE 2460 AUTOPROBER.
*             BASIC LISTENER/TALKER ROUTINES
*             IN THIS MODULE AND WORK OFF OF
*             QUEUE STRUCTURE.
*
*   CALLING SEQUENCE:
*                 JSR  INTI3E   ;INIT IEEE BUS
*
*   NOTE: WHENEVER AN IRQ INTERRUPT OCCURS AN
*         IT IS NOT A TIMER INTERRUPT DO
*
*                         JMP IRQI3E
*
*    REV       DATE        BY          REASON
*    ←←←       ←←←←        ←←          ←←←←←←
*    00        10/22/82    SJF       INIT RELEA
*
```

```
         00FF     A INTMOD EQU    $FF       ;INTERRUPT ON ANYTHING

                    *
                    *  IEEE-68488 INTERFACE REGISTERS
                    *
         E700     A HPREGS EQU    $E700
         E700     A HPREG0 EQU    HPREGS
         E701     A HPREG1 EQU    HPREGS+1
         E702     A HPREG2 EQU    HPREGS+2
         E703     A HPREG3 EQU    HPREGS+3
         E704     A HPREG4 EQU    HPREGS+4
         E705     A HPREG5 EQU    HPREGS+5
         E706     A HPREG6 EQU    HPREGS+6
         E707     A HPREG7 EQU    HPREGS+7
                    *

                    *
                    *  LOW MEMORY EQUATES
                    *
         00AA     A REG0SV EQU    170       ;SAVE COMMAND
         00AB     A BUSERR EQU    171       ;BUS ERROR CODE
         00AC     A STTASK EQU    172       ;SEND STATUS FLAG
         00AD     A XINPRG EQU    173       ;SET WHEN TRANSFER IN
         00AE     A OUTCNT EQU    174       ;SET WHEN MSG IN OUTBU
         00AF     A INCNT  EQU    175       ;COUNT OF MSGS IN INBU
         00B0     A OPMODE EQU    176       ;OPERATING MODE LOC/RE
         00B1     A XFRST  EQU    177       ;TRANSFER STATUS
                    *
         045E     A INBCF  EQU    1118      ;INPUT BUF CONTROL FIE
         0466     A OUTBCF EQU    1126      ;OUTPUT BUF CONTROL FI
         04D4     A OUTBUF EQU    1236      ;100 BYTE OUTPUT BUFFE
         0539     A OUTEND EQU    1337      ;END OFOUTPUT BUFFER

```

```
00001                             NAM     HY10IEEE
00002                             OPT     REL,CRE,NOG
00003
00004                             TTL     IEEE INTERFACE ROUTINES
00005                       *
00006                       * INTERNAL REFERENCES
00007                       *
00008                             XDEF    IRQI3E,INTI3E
00009
00010                       *
00011                       *  EXTERNAL REFRENCES
00012                       *
00013                             XREF    INTBCF,FORMST
00014                             XREF    PUTCHR,GETCHR,OTCRLF
00015                             XREF    INTDEV,KINT
00016
00017                       *
00018                       *  THE FOLLOWING ARE BYTE INTERRUPT EQUATES
00019                       *
00020          0001     A BIBIT  EQU      $01
00021          0002     A ENDBIT EQU      $02
00022          0004     A CMDBIT EQU      $04
00023          0020     A GETBIT EQU      $20
00024          0040     A BOBIT  EQU      $40
00025                       *
00026                       *  BUS ERROR EQUATES
00027                       *
00028          0001     A BADIRQ EQU      $1
00029          0002     A QUEFUL EQU      $2
00030          0003     A NOLSTN EQU      $3
00031          0004     A BDUCMD EQU      $4
00032          0005     A UKINTR EQU      $5
00033          0006     A NOTALK EQU      $6
00034          0007     A BDSTRG EQU      $7
00035                       *
00036                       *  STATE BITS
00037                       *
00038          0040     A REMBIT EQU      $40
00039          0008     A RLCBIT EQU      $08
00040          0008     A TACBIT EQU      $08
00041          0004     A LACBIT EQU      $04
00042          0080     A UACBIT EQU      $80
00043          0001     A UUCBIT EQU      $01
00044          0002     A DCABIT EQU      $02
00045          0004     A SPABIT EQU      $04
00046                       *
00047                       *  MODES OF TRANSMISSION
00048                       *
00049          00FF     A ACTMOD EQU      $FF        ;ACTIVE MODE
00050          0000     A ALRMOD EQU      $00        ;ALARM MODE
00051          0001     A IGNMOD EQU      $01        ;IGNORE MODE
00052          0002     A DACMOD EQU      $02        ;DEACTIVATE MODE
00053
00054                       *
00055                       *   OTHER EQUATES
00056                       *
00057          000A     A STRTRM EQU      $0A        ;STRING TERMINATOR
00058          003F     A STCHAR EQU      $3F        ;STATUS CHARACTER
```

SECTION III

IEEE-488 DRIVER

REFERENCE: FINAL REPORT SECTION 2, SUBSECTION E.5,.....PAGE 2-27

1. IRQI3E - IEEE-488 BUS INTERRUPT PROCESSOR
2. INTI3E - IEEE-488 HARDWARE INITIALIZATION
3. TALKER - IEEE-488 BUS DATA OUTPUT
4. CLSTN - IEEE-488 BUS COMMAND PROCESSOR
5. DLSTN - IEEE-488 BUS DATA INPUT

```
C
C ------ REPORT ERRORS ------
C
90    CALL CLOSE (DCB)
95    CALL ERROR (IERR)
      RETURN
      END
```

```
 FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


 **  NO WARNINGS **  NO ERRORS **   PROGRAM = 00442      COMMON = 00000
```

```
         SUBROUTINE DSPLY (FNAME)
C        ========================
C
C
         INTEGER FNAME(3),DCB(144),BFR(13)
         INTEGER PINAM(5),ASD(3),ASE(3)
C
         EQUIVALENCE (PINAM(1),BFR(1))
         EQUIVALENCE (ASD(1),BFR(8)),(ASE(1),BFR(11))
C
C ------       OPEN HYBRID TABLE FILE      ------
C ------ SET BIT 0 FOR NON-EXCLUSIVE OPEN ------
C
         CALL OPEN (DCB,IERR,FNAME,1B)
         IF (IERR.LT.0) GO TO 95
C
C ------ REQUEST LISTING DEVICE - CRT/LP ------
C
20       WRITE (1,120)
120      FORMAT ("DISPLAY DEVICE - (1) CRT OR (6) LP? _")
         READ (1,*) LU
         IF (LU.NE.1.AND.LU.NE.6) GO TO 20
C
C ------ WRITE OUT DISPLAY HEADINGS ------
C
         WRITE (LU,140) (FNAME(I),I=1,3)
140      FORMAT (//12X,"HYBRID TABLE FILE ",3A2,
        &///"  PIN NAME",8X,"X",6X,"Y",9X,"D",7X,"E"/)
C
C ------                 READ A RECORD             ------
C ------ SKIP DELETED RECORDS AND CHECK FOR EOF ------
C
50       CALL READF (DCB,IERR,BFR)
         IF (IERR.LT.0) GO TO 90
         IF (BFR(1).EQ.2H**.AND.BFR(2).EQ.2H**) GO TO 50
         IF (BFR(1).EQ.2H  .AND.BFR(2).EQ.2H  ) GO TO 70
C
C ------ DISPLAY THE RECORD - PIN NAME,(X,Y),(D,E) ------
C
         WRITE (LU,160) PINAM,BFR(6),BFR(7),ASD,ASE
160      FORMAT (" ",5A2,I9,I7,5X,3A2,2X,3A2)
C
         GO TO 50
C
C ------ EOF, CLOSE FILE AND RETURN ------
C
70       IF (LU.NE.6) GO TO 80
         DO 75 I=1,4
75       WRITE (LU,175)
175      FORMAT ("1")
C
80       CALL CLOSE (DCB)
         WRITE (1,180)
180      FORMAT (//"TABLE FILE DISPLAY COMPLETED")
         RETURN
```

```
      SUBROUTINE ZERDE (ASC)
C     =====================
C
C
      INTEGER ASC(3)
C
      DO 20 I=1,3
C
C ------ CHECK MSB. IF BLANK, CHANGE TO ZERO ------
C
      IF (IAND (ASC(I),177400B).NE.20000B) GO TO 30
      ASC(I) = IAND (ASC(I),377B) + 30000B
C
C ------ CHECK LSB. IF BLANK, CHANGE TO ZERO ------
C
      IF (IAND (ASC(I),377B).NE.40B) GO TO 40
      ASC(I) = IAND (ASC(I),177400B) + 60B
C
20    CONTINUE
      RETURN
C
C ------ MSB IS NOT BLANK. CHECK IF IT IS NEGATIVE SIGN ------
C
30    IF (IAND (ASC(I),177400B).NE.26400B) GO TO 50
      ASC(I) = IAND (ASC(I),377B) + 30000B
      GO TO 45
C
C ------ LSB IS NOT BLANK. CHECK IF IT IS NEGATIVE SIGN ------
C
40    IF (IAND (ASC(I),377B).NE.55B) GO TO 50
      ASC(I) = IAND (ASC(I),177400B) + 60B
C
C ------ COORDINATE IS NEGATIVE ------
C
45    ASC(1) = IAND (ASC(1),377B) + 26400B
      RETURN
C
C ------ COORDINATE IS POSITIVE ------
C
50    ASC(1) = IAND (ASC(1),377B) + 20000B
      RETURN
      END
```

```
FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)

**  NO WARNINGS **  NO ERRORS **   PROGRAM = 00142      COMMON = 00000
```

```
C
40     D = YC
       E = XC
       GO TO 20
C
C ------ HORIZONTAL REFERENCE, DETERMINE SIGNS AND VALUES ------
C
50     XC = -XC
       RETURN
C
60     YC = -YC
       RETURN
       END
```

```
FTN4 COMPILER: HP92060-16092 REV. 2026 (800423)


**  NO WARNINGS **  NO ERRORS **   PROGRAM = 00329      COMMON = 00000
```

```
00382                              *
00383                              *  TRANSMISSION OF THIS MESSAGE IS COMPLETE
00384                              *
00385P 0151F C1    0A      A             CMPB    #STRTRM   ;STRING TERMINATOR?
00386P 0151 27    0E    0161             BEQ     DLST62    ;YES
00387                              *
00388P 0153 86    07      A              LDA     #BDSTRG   ;SET ERROR
00389P 0155 97    AB      A              STA     BUSERR
00390                              *
00391P 0157 C6    0A      A              LDB     #STRTRM   ;PUT IN TERMINATOR
00392P 0159 8E    045E    A              LDX     #INBCF
00393P 015C BD    0000    A              JSR     PUTCHR
00394P 015F 25    E1    0142             BCS     DLST55    ;BUFFER FULL
00395                              *
00396P 0161 96    B1      A DLST62 LDA     XFRST
00397P 0163 81    01      A              CMPA    #IGNMOD   ;IN IGNORE MODE?
00398P 0165 27    02    0169             BEQ     DLST63    ;YES
00399P 0167 0C    AF      A              INC     INCNT
00400P 0169 86    FF      A DLST63 LDA     #ACTMOD   ;SET TO ACTIVE FOR NEX
00401P 016B 97    B1      A              STA     XFRST
00402P 016D 7E    018E    P DLST65 JMP     I3EXIT
00403                              *
00404                              *  CHECK FOR STATUS REQUEST
00405                              *
00406P 0170 C1    3F      A DLST70 CMPB    #STCHAR   ;IS IT STATUS CHAR?
00407P 0172 26    0A    017E             BNE     DLST80    ;NO
00408                              *
00409P 0174 C6    FF      A              LDB     #$FF
00410P 0176 D7    AC      A              STB     STTASK
00411                              *
00412P 0178 C6    01      A              LDB     #IGNMOD   ;IGNORE REST OF BYTES
00413P 017A D7    B1      A              STB     XFRST
00414P 017C 20    CB    0149             BRA     DLST60    ;CHECK END BIT BEFORE
00415                              *
00416P 017E 34    04      A DLST80 PSHS    B         ;SAVE CHAR
00417P 0180 8E    045E    A              LDX     #INBCF
00418P 0183 C6    3F      A              LDB     #STCHAR   ;PUT IN PREVIOUS CHAR
00419P 0185 BD    0000    A              JSR     PUTCHR
00420P 0188 35    04      A              PULS    B         ;RESTORE CUR CHAR
00421P 018A 25    B6    0142             BCS     DLST55    ;Q FULL - ERROR
00422P 018C 20    AC    013A             BRA     DLST50
00423
```

```
00425
00426                            *
00427                            *  THE FOLLOWING ROUTINE WILL SET THE BUS IN
00428                            *   ANOTHER INTERRUPT IS PENDING. OTHERWISE,
00429                            *    EXITING FROM INTERRUPT WILL OCCURR.
00430                            *
00431             018E      P I3EXIT EQU     *
00432P 018E 4F                       CLRA                ;TOGGLE INTR MASK
00433P 018F B7    E700      A        STA     HPREG0
00434P 0192 43                       COMA
00435P 0193 B7    E700      A        STA     HPREG0
00436P 0196 3B                       RTI
00437
00438                                END
TOTAL ERRORS 00000--00000
TOTAL WARNINGS 00000--00000



   00FF ACTMOD 00049*00343 00400
   0000 ALRMOD 00050*00353 00361
   0001 BADIRQ 00028*00153
   0007 BDSTRG 00034*00388
   0004 BDUCMD 00031*00319
   0001 BIBIT  00020*00134
   0040 BOBIT  00024*00143
   00AB BUSERR 00079*00154 00194 00321 00337 00374 00389
   00D6 CLST20 00277 00290*
   00E0 CLST40 00291 00298*
 P 00EC CLST60 00299 00305*
 P 00F8 CLST70 00306 00308 00317*
 P 00FF CLST80 00313 00321*
 P 00C2 CLSTN  00141 00275*
   0004 CMDBIT 00022*00140
   0002 DACMOD 00052*00357
   0002 DCABIT 00044*00298
 P 0112 DLST10 00332 00340*
 P 012C DLST20 00347 00357*
 P 0132 DLST30 00344 00361*
 P 013A DLST50 00351 00359 00367*00422
 P 0142 DLST55 00373*00394 00421
 P 0149 DLST60 00365 00369 00379*00414
 P 0161 DLST62 00386 00396*
 P 0169 DLST63 00398 00400*
 P 016D DLST65 00381 00402*
 P 0170 DLST70 00362 00406*
 P 017E DLST80 00407 00416*
 P 0104 DLSTN  00135 00138 00330*
   0002 ENDBIT 00021*00137 00350 00380
R       FORMST 00013*00213
   0020 GETBIT 00023*00146
R       GETCHR 00014*00234
   E700 HPREG0 00065*00129 00172 00254 00433 00435
   E701 HPREG1 00066*00275
   E702 HPREG2 00067*00174 00187 00330
   E703 HPREG3 00068*00150 00168 00170 00247 00302 00318
   E704 HPREG4 00069*00163 00165
   E705 HPREG5 00070*00293
```

```
PAGE  012  HY10IEEE.SA:1  HY10IE IEEE INTERFACE ROUTINES

    E706 HPREG6 00071*
    E707 HPREG7 00072*00240 00255 00340
    E700 HPREGS 00064*00065 00066 00067 00068 00069 00070 00071 00072
    018E I3EXIT 00151 00195 00264 00283 00286 00294 00322 00338 00355
                00375 00402 00431*
    0001 IGNMOD 00051*00364 00397 00412
    045E INBCF  00087*00367 00392 00417
    00AF INCNT  00083*00399
R        INTBCF 00013*00211
R        INTDEV 00015*00303
DP  0031 INTI3E 00008 00163*
    00FF INTMOD 00059*00171
 P  0029 IRQERR 00147 00153*
DP  0000 IRQI3E 00008 00129*
 P  002E IRQNOT 00130 00157*
R        KINT   00015*00157
    0004 LACBIT 00041*00331
    0003 NOLSTN 00030*00336
    0006 NOTALK 00033*00193
    00B0 OPMODE 00084*00281 00285
R        OTCRLF 00014*00217
    0466 OUTBCF 00088*00208 00214 00233 00258 00259 00260
    04D4 OUTBUF 00089*00209
    00AE OUTCNT 00082*00225 00261
    0539 OUTEND 00090*00210
R        PUTCHR 00014*00216 00368 00393 00419
    0002 QUEFUL 00029*00373
    00AA REG0SV 00078*00132 00349 00379
    0040 REMBIT 00038*00282
    0008 RLCBIT 00039*00276
    0004 SPABIT 00045*00290
    003F STCHAR 00058*00346 00406 00418
    000A STRTRM 00057*00237 00245 00385 00391
    00AC STTASK 00080*00197 00202 00410
    0008 TACBIT 00040*00188
 P  0059 TALK10 00189 00197*
 P  0065 TALK20 00204 00208*
 P  0082 TALK50 00198 00222*
 P  008B TALK60 00226 00229*
 P  008D TALK70 00218 00223 00233*
 P  009E TALK75 00235 00245*
 P  00A0 TALK80 00238 00246*
 P  004B TALKER 00144 00187*
 P  00BF TALKRT 00241 00264*
    0080 UACBIT 00042*00307
    0005 UKINTR 00032*00312
    0001 UUCBIT 00043*00305
    00B1 XFRST  00085*00341 00354 00358 00396 00401 00413
    00AD XINPRG 00081*00203 00206 00222 00229 00257
```

SECTION IV

EXECUTIVE/COMMAND PROCESSOR

REFERENCE: FINAL REPORT SECTION 2, SUBSECTION E.3,....PAGE 2-24

1. EXEC - AUTOPROBE EXECUTIVE

2. CMINT - COMMAND INTERPRETOR/PROCESSOR

```
                            NAM    EXEC
                            OPT    REL,CRE,NOG
                     *
                            TTL    HY16EXEC 2460 EXECUTIVE PROCESS
                     *
                     *  DATE:      06/29/81
                     *             10/26/81 MODS FOR DTS-70
                     *
                     *  INTERNAL DEFINITION
                     *
                     *
                            XDEF   EXEC,EXCNTR,UNLDKY,LOADKY
                            XDEF   COFFST
                     *
                     *
                     *  EXTERNAL DEFINITION
                     *
                     *
                            XREF   IKBPIA,DELAY2,ONSTOP,DSKOFF
                            XREF   DSPL,START,CMINTP,TCLRDP
                            XREF   ONLTE,OFFLTE,UPPROB,DNPROB
                            XREF   HOPROB,AUTPRB,MANPRB,TSTPRB
                            XREF   ENTER,CBHEX,CUROFF,FLSHYN
                            XREF   ABSET,MATCH,RERROR,RSTART
                            XREF   OFLNE,CAMOFF,MVPARK
                     *
                     *
                     *  KEY BOARD LIGHT EQUATES
                     *
      0041         A LRUN   EQU    $41        ;RUN LIGHT
      0043         A LLSTOP EQU    $43        ;STOP LIGHT
      0035         A LUNLOD EQU    $35        ;UNLOAD LIGHT
      0034         A LLOAD  EQU    $34        ;LOAD LIGHT
      0032         A LOFSET EQU    $32        ;OFFSET LIGHT
                     *
                     *
                     *  KEY BOARD KEY EQUATES
                     *
                     *
      002D         A KLSTOP EQU    $2D        ;STOP/OFFLINE
      002C         A KRUN   EQU    $2C        ;RUN/ONLINE
      0030         A KABRT  EQU    $30        ;ABORT
      0025         A KUPDWN EQU    $25        ;OFFLINE PROBE UP
      0026         A KUNLOD EQU    $26        ;HOME PROBE
      002A         A KAUTO  EQU    $2A        ;SET TO AUTO MODE
      0028         A KSTEP  EQU    $28        ;SET TO STEP MODE
      0029         A KTEST  EQU    $29        ;SET TO TEST MODE
      0031         A KINPAD EQU    $31        ;INPUT DEBUG ADDR
      0041         A KDSPNX EQU    $41        ;DISPLAY NEXT DEBUG AD
      0020         A KABLGN EQU    $20        ;A/B ALIGNMENT
      0022         A KLOAD  EQU    $22        ;LOAD HYBRID
      0024         A KPTRIG EQU    $24        ;PROBE TRIGGER
      0021         A KOFSET EQU    $21        ;OFFSET FOR HYBRID
                     *
                     *  OTHER EQUATES
                     *
      001F         A ABFLEN EQU    31         ;DEBUG BUF LENGTH
      0003         A IDLMOD EQU    $3         ;IDLE MODE
```

```
00059          00FF    A EOTCHR EQU    $FF       ;END OF TABLE CHAR
00060          0004    A BOFFST EQU    $4        ;OFFSET BIT IN ABFLAG
00061                    *
00062                    *
00063                    *  ERROR EQUATES
00064                    *
00065          0080    A OPABRT EQU    $80       ;OPERATOR/FATAL ABORT
00066          0081    A IEEEER EQU    $81       ;IEEE BUS ERROR
00067                    *
00068                    *  LOW MEMORY EQUATES
00069                    *
00070                    *
00071          0010    A KEY    EQU    16        LAST KEY BUTTON PUSHED
00072          00A4    A ZDIR   EQU    164       CURRENT Z DIRECTION
00073          00B2    A UOFSET EQU    178       USE OFFSET FLAG
00074          00AF    A INCNT  EQU    175       INPUT MESSAGE COUNT
00075          009F    A ONOFFL EQU    159       ONLINE/OFFLINE
00076          01F3    A DSPADR EQU    499       DISPLAY ADDR
00077          01F5    A ADRBUF EQU    501       DISPLAY BUFFER
00078          01F1    A HEXRES EQU    497       ;HEX RESULT OF ADDR
00079          00AB    A BUSERR EQU    171       BUS ERROR CODE
00080          00A2    A CURMOD EQU    162       CURRENT OPERATING MODE
00081          00A7    A ABFLAG EQU    167       AB ALIGNMENT FLAG
00082          00A1    A ONOFSV EQU    161       ONLINE/OFFLINE MODE SA
00083          007E    A OFFSTF EQU    126       OFFSET KNOWN FLAG
00084                    *
00085                    *
00086                    *  HARDWARE EQUATES
00087                    *
00088                    *
00089          E070    A LIGHT  EQU    $E070     CPU LED LIGHTS
00090          E130    A FORCE  EQU    $E130     FORCE PIA
00091          E120    A BFPIA  EQU    $E120     BOND FUNCTION PIA
00092          E710    A PRSWIT EQU    $E710     ;PROBE SWITCH
```

```
0094               0000     P EXEC    EQU     *          EXECUTIVE ENTRY
0095P 0000 10CE 03FF     A            LDS     #$03FF     INITIALIZE STACK ADDR.
0096                       *
0097P 0004 86   40       A            LDA     #$40       ON BIT 6 LED
0098P 0006 B7   E070     A            STA     LIGHT
0099                       *
0100P 0009 0F   B2       A            CLR     UOFSET     CLEAR USE OF OFFSET FL
00101P 000B 86   20       A            LDA     #$20       SET FORCE TO MIN.
0102P 000D 43                         COMA
00103P 000E B7   E130     A            STA     FORCE
00104                       *
00105P 0011 BD   0000     A            JSR     IKBPIA     CLEAR ALL LIGHTS
00106                       *
00107P 0014 8E   0190     A            LDX     #400       DELAY 400 M-SECOND
00108P 0017 BD   0000     A            JSR     DELAY2
00109                       *
00110                       *  TURN OFF DISK
00111                       *
00112P 001A BD   0000     A            JSR     DSKOFF
00113                       *
00114P 001D B6   E121     A            LDA     BFPIA+1    USE TARGET CAMERA
00115P 0020 84   F7       A            ANDA    #$F7
00116P 0022 B7   E121     A            STA     BFPIA+1
00117                       *
00118P 0025 BD   0000     A            JSR     ONLTE      ;TURN ON RUN LIGHT
00119P 0028      41       A            FCB     LRUN
00120P 0029 BD   01D8     P            JSR     DSPMOD     ;DISPLAY CURRENT MODE
00121P 002C 0F   10       A            CLR     KEY        ;INIT KEY BUFFER
00122                       *
00123                       *  THE FOLLOWING THE THE MAIN CONTROL LOOP
00124                       *
00125              002E     P EXCNTR  EQU     *
00126P 002E 96   10       A            LDA     KEY
00127P 0030 26   23   0055             BNE     EXEC30     LOOP IF ZERO
00128                       *
00129P 0032 0D   AB       A            TST     BUSERR     ;DID ANY BUS ERRORS OC
00130P 0034 27   10   0046             BEQ     EXEC10     ;NO
00131P 0036 BD   0000     A            JSR     DSPL       ;YES
00132P 0039      0225     P            FDB     BUSMSG
00133                       *
00134P 003B BD   0000     A            JSR     TCLRDP
00135P 003E C6   81       A            LDB     #IEEEER
00136P 0040 BD   0000     A            JSR     RERROR     ;REPORT IEEE BUS ERROR
00137P 0043 7E   007B     P            JMP     FTLABT     ;FATAL ABORT
00138                       *
00139P 0046 0D   9F       A EXEC10    TST     ONOFFL     ;IN OFFLINE MODE?
00140P 0048 26   E4   002E             BNE     EXCNTR     ;YES
00141P 004A 0D   AF       A            TST     INCNT      ;ANY MESSAGES WAITING
00142P 004C 27   E0   002E             BEQ     EXCNTR     ;NO
00143P 004E BD   0000     A            JSR     CMINTP     ;YES, PROCESS
00144P 0051 0A   AF       A            DEC     INCNT      ;ONE LESS MESSAGE
00145P 0053 20   03   0058             BRA     EXEC50
00146                       *
00147P 0055 BD   016E     P EXEC30    JSR     KEYPRC     ;PROCESS KEY
00148P 0058 BD   01D8     P EXEC50    JSR     DSPMOD     ;DISPLAY CURRENT MODE
00149P 005B 20   D1   002E             BRA     EXCNTR
00150                       *
```

```
152                          *
153                          *  STOP KEY PROCESSOR
 4                           *
155P 005D C6   FF       A STOPKY LDB     #$FF
156P 005F D7   A1       A        STB     ONOFSV   ;SET TO OFFLINE
157                          *
158P 0061 BD   0000     A        JSR     ONLTE
159P 0064      43       A        FCB     LLSTOP   ;TURN ON DIAG LITES
160P 0065 BD   0000     A        JSR     OFFLTE
161P 0068      41       A        FCB     LRUN     ;TURN OFF RUN LIGHT
162                          *
163P 0069 39                     RTS
164                          *
165                          *  RUN KEY PROCESSOR
166                          *
167P 006A 0F   A1       A RUNKY  CLR     ONOFSV
168P 006C BD   0000     A        JSR     OFFLTE
169P 006F      43       A        FCB     LLSTOP   ;TURN OFF STOP LIGHT
170P 0070 BD   0000     A        JSR     ONLTE
171P 0073      41       A        FCB     LRUN     ;TURN ON RUN LIGHT
0172P 0074 39                    RTS
0173                         *
0174                         * ABORT KEY PROCESSOR
0175                         *
0176P 0075 96  A2       A ABRTKY LDA     CURMOD   ;GET CURRENT MODE
0177P 0077 81  03       A        CMPA    #IDLMOD  ;IN IDLE MODE?
0178P 0079 26  08   0083         BNE     ABRT10   ;NO,PUT IN IDLE
  79                         *
 80P 007B C6   80       A FTLABT LDB     #OPABRT  ;REPORT OPERATOR/FATAL
0181P 007D BD  0000     A        JSR     RERROR
0182P 0080 7E  0000     A        JMP     RSTART   ;YES ABORT
0183                         *
0184P 0083 BD  0000     A ABRT10 JSR     DSPL     DISP ABORT MSG
0185P 0086     0265     P        FDB     ABRTMS
0186                         *
0187P 0088 BD  0000     A        JSR     FLSHYN   ;FLASH YES/NO
0188P 008B 26  0F   009C         BNE     ABRT20   ;NO OR ABORT
0189                         *
0190P 008D BD  0000     A        JSR     CUROFF   TURN OF CUURENT MODE
0191P 0090 BD  0000     A        JSR     HOPROB
0192P 0093 86  03       A        LDA     #IDLMOD
0193P 0095 97  A2       A        STA     CURMOD   ;SET TO IDLE MODE
0194P 0097 C6  80       A        LDB     #OPABRT  ;SET ABORT ERR CODE
0195P 0099 BD  0000     A        JSR     RERROR
0196P 009C 39             ABRT20 RTS
0197                         *
0198                         *  A/B ALIGNMENT KEY PROCESSOR
0199                         *
0200P 009D 96  A7       A ABLNKY LDA     ABFLAG   ;IS OFFSET KNOWN?
0201P 009F 85  04       A        BITA    #BOFFST
0202P 00A1 27  09   00AC         BEQ     ABLN40   ;NO
0203                         *
  04P 00A3 BD  0000     A        JSR     ABSET
  05P 00A6 96  10       A        LDA     KEY      ;DID USER ABORT
  06P 00A8 81  30       A        CMPA    #KABRT
0207P 00AA 27  C9   0075         BEQ     ABRTKY   ;YES
0208P 00AC 39             ABLN40 RTS
0209                         *
```

```
)                              *    UP/DOWN PROBE KEY
.                              *
2P 00AD 0D    A4      A UPDNKY TST     ZDIR      ;CURRENTLY PROBE UP?
3P 00AF 27    03   00B4        BEQ     UPDN10    ;YES, GO DOWN
I                              *
5P 00B1 7E    0000    A        JMP     UPPROB    ;NO, RAISE PROBE
5P 00B4 7E    0000    A UPDN10 JMP     DNPROB    ;YES
7                              *
3                              *  UNLOAD KEY PROCESSOR
7                              *
0P 00B7 BD    0000    A UNLDKY JSR     DSPL
1P 00BA       0251    P        FDB     UNLMSG    ;DISPLAY UNLOAD MSG
2P 00BC BD    0000    A        JSR     ONLTE
3P 00BF       35      A        FCB     LUNLOD    ;TURN ON UNLOAD LIGHT
4P 00C0 BD    0000    A        JSR     MVPARK    ;MOVE TO PARK
5P 00C3 BD    0000    A        JSR     OFFLTE
6P 00C6       35      A        FCB     LUNLOD    ;TURN OFF UNLOAD LIGHT
7P 00C7 39                     RTS
8                              *
9                              *   AUTO KEY PROCESSOR
0                              *
1P 00C8 D6    A2      A AUTOKY LDB     CURMOD
2P 00CA C1    03      A        CMPB    #IDLMOD   ;INVALID IN IDLE
3P 00CC 27    08   00D6        BEQ     AUTO20    ;SKIP NEXT TWO
4                              *
5P 00CE BD    0000    A        JSR     AUTPRB    ;VALID?
6P 00D1 25    03   00D6        BCS     AUTO20    ;NO
7                              *
8P 00D3 BD    006A    P AUTO10 JSR     RUNKY     ;TURN TO RUN MODE
9P 00D6 39              AUTO20 RTS
0                              *
1                              *  STEP KEY PROCESSOR
2                              *
3P 00D7 D6    A2      A STEPKY LDB     CURMOD
4P 00D9 C1    03      A        CMPB    #IDLMOD   ;VALID MODE
5P 00DB 27    F9   00D6        BEQ     AUTO20    ;NO
6                              *
7P 00DD BD    0000    A        JSR     MANPRB
8P 00E0 24    F1   00D3        BCC     AUTO10    ;VALID CHANGE
9P 00E2 39                     RTS
0                              *
1                              *  TEST KEY PROCESSOR
2                              *
3P 00E3 BD    0000    A TESTKY JSR     TSTPRB    ;VALID?
4P 00E6 25    EE   00D6        BCS     AUTO20    ;NO
5                              *
6P 00E8 BD    0000    A TEST10 JSR     OFLNE
7P 00EB 96    10      A        LDA     KEY
8P 00ED 81    30      A        CMPA    #KABRT    ;WAS ABORT PRESSED?
9P 00EF 26    09   00FA        BNE     TEST20    ;NO
0P 00F1 BD    0075    P        JSR     ABRTKY    ;DO ABORT PROCESSING
1                              *
2P 00F4 96    A2      A        LDA     CURMOD    ;DID WE ABORT TEST MOD
3P 00F6 81    03      A        CMPA    #IDLMOD
4P 00F8 26    EE   00E8        BNE     TEST10    ;NO
5P 00FA 39              TEST20 RTS
6                              *
7                              *  DEBUG INPUT ADDRESS KEY PROCESSOR
```

```
,8                              *
,9P 00FB BD    0000     A INADKY JSR    ENTER     ;ENTER THE ADDRESS
'0P 00FE       023A     P        FDB    INPMSG
'1P 0100       15       A        FCB    21
'2P 0101       05       A        FCB    5
'3                              *
'4P 0102 4D                      TSTA             ;USER ABORT?
'5P 0103 102B FF6E 0075          LBMI   ABRTKY    ;YES
'6                              *
'7P 0107 10BF 01F3      A        STY    DSPADR
'8                              *
'9                              *  ENTRY POINT FOR DISPLAY NEXT ADDRESS
30                              *  KEY PROCESSOR
31                              *
32P 010B BD    0191     P DSNXKY JSR    DISPLY
33P 010E BD    0000     A        JSR    TCLRDP
34P 0111 39                      RTS
35                              *
36                              *  PROBE TRIGGER KEY
37                              *     WHEN THE USER PRESSES THIS KEY, A ONE-S
38                              *     WILL BE TRIGGERED TO CLOSE THE PROBE SW
39                              *     FOR A FEW MILLISECONDS SO THAT THE DTS-
90                              *     CAN READ THE DESIRED INFORMATION
91                              *
92P 0112 0D    A4       A PRTRKY TST    ZDIR      ;IS THE PROBE DOWN?
93P 0114 27    09   011F         BEQ    PRTR20    ;NO
94                              *
95P 0116 96    A2       A        LDA    CURMOD
96P 0118 81    02       A        CMPA   #2        ;IN M0 OR M1?
97P 011A 24    03   011F         BCC    PRTR20    ;NO,ILLEGAL KEY
98                              *
99P 011C 7D    E710     A PRTR10 TST    PRSWIT    ;CLOSE SWITCH
00P 011F 39               PRTR20 RTS
01                              *
02                              *  OFFSET KEY PROCESSOR
03                              *
04                              *     THIS PROCESSOR WILL CALCULATE THE NECES
05                              *     CAMERA OFFSET VALUES SO THAT THE PROBE
06                              *     APPEAR TO BE OVER A DESIRED POINT.
07                              *
08P 0120 8D    09   012B OFSTKY BSR    COFFST    ;CALC CAMERA OFFSET
09                              *
10P 0122 96    10       A OFST30 LDA    KEY
11P 0124 81    30       A        CMPA   #KABRT    ;DID USER ABORT?
12P 0126 1027 FF4B 0075          LBEQ   ABRTKY    ;YES
13P 012A 39                      RTS              ;NO
14                              *
15                              *  MINI-PROCESSOR FOR CAMERA OFFSET
16                              *
17P 012B BD    0000     A COFFST JSR    ONLTE     ;TURN ON OFFSET LIGHT
18P 012E       32       A        FCB    LOFSET
19                              *
20P 012F BD    0000     A        JSR    CAMOFF    ;OFFSET CALC
21P 0132 96    10       A        LDA    KEY
22P 0134 81    30       A        CMPA   #KABRT    ;DID USER ABORT?
23P 0136 27    06   013E         BEQ    COFF1     ;YES
24P 0138 96    A7       A        LDA    ABFLAG    ;SET OFFSET KNOWN BIT
25P 013A 8A    04       A        ORA    #BOFFST
```

```
.P 013C 97   A7       A         STA    ABFLAG
                        *
P 013E BD   0000     A COFF1   JSR    OFFLTE    ;TURN OFF OFFSET LIGHT
'P 0141      32       A         FCB    LOFSET
P 0142 39                       RTS

                        *
                        *   LOAD HYBRID KEY PROCESSOR
                        *
                        *      THIS PROCEDURE MUST BE DONE FOR ALL
                        *      HYBRIDS BEFORE ANY MOVES CAN BE
                        *      PERFORMED. THIS KEY PERFORMS TWO FUNCTI
                        *      1.  CALCULATES THE CAMERA OFFSET AND 2.
                        *      SETS AND ALIGNS THE A/B ALIGNMENT POINT
                        *
.P 0143 BD   0000     A LOADKY  JSR    ONLTE     ;TURN ON LOAD LIGHT
2P 0146      34       A         FCB    LLOAD
3P 0147 BD   0000     A         JSR    MVPARK    ;MOVE TO PARK
4P 014A BD   0000     A         JSR    DSPL
5P 014D      0271     P         FDB    LOADMS
6                       *
7P 014F BD   0000     A         JSR    TCLRDP
8P 0152 26   14   0168          BNE    LOAD15    ;USER ABORTED
9                       *
0P 0154 96   7E       A         LDA    OFFSTF    ;IS OFFSET KNOWN?
1P 0156 81   01       A         CMPA   #1
2P 0158 27   0B   0165          BEQ    LOAD10    ;YES, SKIP OFFSET
3                       *
4P 015A BD   0000     A         JSR    HOPROB    ;HOME PROBE
5P 015D 8D   CC   012B          BSR    COFFST    ;CALC OFFSET
6P 015F 96   10       A         LDA    KEY
7P 0161 81   30       A         CMPA   #KABRT    ;DID USER ABORT?
8P 0163 27   03   0168          BEQ    LOAD15    ;YES
9                       *
0P 0165 BD   0000     A LOAD10  JSR    ABSET     ;ALIGN AB
1                       *
2P 0168 BD   0000     A LOAD15  JSR    OFFLTE    ;TURN OFF LOAD LIGHT
3P 016B      34       A         FCB    LLOAD
4                       *
5P 016C 20   B4   0122 LOAD50   BRA    OFST30
6                       *
```

```
                             *
                             *  THE FOLLOWING ROUTINE WILL DETERMINE
                             *  WHICH KEY WAS LAST PRESSED AND VECTOR
                             *  THE EXECUTIVE PROCESSOR TO THE KEY
                             *  PROCESSOR FOR THAT PARTICULAR KEY.
                             *
P 016E 8E   0289     P KEYPRC LDX   #KEYTBL   ;PTR TO KEY JUMP TABLE
P 0171 108E 0010     A        LDY   #KEY      ;POINT TO KEY
P 0175 C6   01       A        LDB   #1        ;MATCH COUNT
P 0177 BD   0000     A        JSR   MATCH     ;DID A MATCH OCCUR?
P 017A 25   12  018E          BCS   KEYRTN    ;NO
                             *
P 017C 96   9F       A        LDA   ONOFFL    ;SAVE CUR ONLINE/OFFLI
P 017E 97   A1       A        STA   ONOFSV
P 0180 86   FF       A        LDA   #$FF      ;SET TO OFFLINE/BUSY
P 0182 97   9F       A        STA   ONOFFL
P 0184 EC   84       A        LDD   0,X       ;GET RELATIVE BRANCH
P 0186 30   8B       A        LEAX  D,X       ;MAKE ABSOLUTE
P 0188 AD   84       A        JSR   0,X       ;GO TO ROUTINE
P 018A 96   A1       A        LDA   ONOFSV    ;RESTORE ONLINE/OFFLIN
P 018C 97   9F       A        STA   ONOFFL
P 018E 0F   10       A KEYRTN CLR   KEY       ;INIT KEY
P 0190 39                     RTS
```

```
                           *
                           *    NAME:   DISPLY
                           *
                           *    FUNCTION:  TO DISPLAY THE NEXT 8 BYTES
                           *               OF MEMORY TO THE KEYBOARD DISPLA
                           *               THE START ADDRESS IS POINTED TO
                           *               DSPADR.
                           *
                           *    CALLING SEQUENCE:    JSR DISPLY
                           *
                           *    UPON RETURN:    DSPADR WILL AUTOMATICALLY
                           *                    UPADTED TO POINT TO NEXT
                           *                    BYTES OF DATA.
                           *
0191 34    40         A DISPLY PSHS    U          ;SAVE REG
0193 8E    01F5       A        LDX     #ADRBUF    ;FORMAT BUFFER
0196 86    20         A        LDA     #$20
0198 C6    1F         A        LDB     #ABFLEN    ;LENGTH OF BUFFER
                           *
019A A7    80         A DISP10 STA     ,X+        ;BLANK BUFFER
019C 5A                        DECB
019D 26    FB    019A          BNE     DISP10
                           *
                           *    OUTPUT THE START ADDRESS IN HEX
                           *
019F B6    01F3       A        LDA     DSPADR     ;GET MSB OF CUR ADDR
01A2 BD    0000       A        JSR     CBHEX      ;CONVERT TO HEX
01A5       01F5       A        FDB     ADRBUF
01A7 B6    01F4       A        LDA     DSPADR+1   ;GET MSB OF CUR ADDR
01AA BD    0000       A        JSR     CBHEX      ;CONVERT TO HEXT
01AD       01F7       A        FDB     ADRBUF+2
                           *
                           *   DISPLAY 8 BYTES
                           *
01AF CE    01FB       A        LDU     #ADRBUF+6
01B2 C6    08         A        LDB     #8
01B4 10BE  01F3       A        LDY     DSPADR
                           *
01B8 A6    A0         A DISP30 LDA     ,Y+        ;GET BYTE
01BA BD    0000       A        JSR     CBHEX      ;CONVERT TO HEX
01BD       01F1       A        FDB     HEXRES
                           *
01BF BE    01F1       A        LDX     HEXRES     ;GET HEX RESULT
01C2 AF    C4         A        STX     0,U        ;STORE IN FORMAT BUFFE
                           *
01C4 33    43         A        LEAU    3,U        ;UPDATE FORMAT POINTER
01C6 5A                        DECB
01C7 26    EF    01B8          BNE     DISP30
                           *
01C9 86    0D         A        LDA     #$0D       ;END OF MESSAGE
01CB A7    C4         A        STA     ,U
01CD 10BF  01F3       A        STY     DSPADR     ;UPDATE CUR DISPLAY AD
01D1 BD    0000       A        JSR     DSPL       ;DISPLAY TO KEYBOARD
01D4       01F5       A        FDB     ADRBUF
                           *
01D6 35    C0         A        PULS    U,PC
```

```
                        *
                        *  THIS ROUTINE WILL DISPLAY THE
                        *  CURRENT OPERATING MODE TO THE
                        *  KEYBOARD DISPLAY.
                        *
01D8 96   A2          A DSPMOD LDA    CURMOD    ;IN AUTO MODE
01DA 26   07   01E3            BNE    DS2A      ;NO
01DC BD   0000        A        JSR    DSPL
01DF      01FD        P        FDB    AUTMSG
01E1 20   19   01FC            BRA    DSPRTN
                        *
01E3 4A                 DS2A   DECA             ;IN STEP MODE?
01E4 26   07   01ED            BNE    DS2B      ;NO
01E6 BD   0000        A        JSR    DSPL      ;YES
01E9      0207        P        FDB    STPMSG
01EB 20   0F   01FC            BRA    DSPRTN
                        *
01ED 4A                 DS2B   DECA             ;TEST MODE?
01EE 26   07   01F7            BNE    DS2C      ;NO
01F0 BD   0000        A        JSR    DSPL
01F3      0211        P        FDB    TSTMSG
01F5 20   05   01FC            BRA    DSPRTN
                        *
01F7 BD   0000        A DS2C   JSR    DSPL      ;ASSUME IDLE
01FA      021B        P        FDB    IDLMSG
                        *
01FC 39                 DSPRTN RTS
                        *
```

```
                               *
                               *  ROUTINE TO MATCH STRINGS. LEADINGS BLANKS
                               *  SOURCE STRING (PASSED IN Y-REG) WILL BE SU
                               *  AND VALIDITY OF THE COMMAND DETERMINED. IF
                               *  MATCH OCCURS,THE CARRY BIT WILL BE CLEARED
                               *  THE X-REG WILL CONTAIN THE ADDRESS OF THAT
                               *  PARTICULAR COMMAND PROCESSOR.  IF THERE IS
                               *  MATCH, THE CARRY WILL RETURN SET.
                               *
                               *     CALLING PARAMETERS:  LDX  #TABLE POINTE
                               *                          LDY  SOURCE POINTE
                               *                          LDB  MATCH COUNT
                               *                          JSR  MATCH
                               *
                               *    NOTE: 1) % MAY BE USED AS A DONT CARE CH
                               *          2) ALL STRINGS MUST BE OF EQUAL LE
                               *
      009F        P MATCH  EQU     *
09F D7   A0       A        STB     MTCNT     ;SAVE MATCH COUNT
0A1 109F CF       A        STY     SRCPTR    ;SAVE SOURCE PTR
                               *
                               *  MATCH LOOP
                               *
0A4 A6   80       A MATCH2 LDA     ,X+       ;GET TABLE CHAR
0A6 81   00       A        CMPA    #DONTCR   ;IS IT DONT CARE?
0A8 27   04   00AE         BEQ     MATCH3    ;YES, AUTOMATCH
                               *
0AA A1   A4       A        CMPA    0,Y       ;MATCH SOURCE CHAR?
0AC 26   08   00B6         BNE     MATCH5    ;NO
                               *
0AE 31   21       A MATCH3 LEAY    1,Y
0B0 5A                     DECB              ;MATCH COMPLETE?
0B1 26   F1   00A4         BNE     MATCH2    ;NO
                               *
                               *  MATCH COMPLETE - GET COMMAND PROCESSOR ADD
                               *
0B3 1C   FE       A        ANDCC   #$FE
0B5 39                     RTS
                               *
                               *  THIS ENTRY DOES NOT MATCH. FLUSH THROUGH T
                               *  NEXT ENTRY IF ANY
                               *
0B6 5A                MATCH5 DECB
0B7 3A                     ABX               ;POINT TO END OF STRIN
                               *
0B8 30   02       A        LEAX    2,X       ;SKIP JUMP VECTOR
0BA A6   84       A        LDA     0,X
0BC 81   FF       A        CMPA    #EOTCHR   ;DISPLAY END CHAR
0BE 27   07   00C7         BEQ     MATCH7    ;YES
0C0 109E CF       A        LDY     SRCPTR    ;CONTINUE ON
0C3 D6   A0       A        LDB     MTCNT
0C5 20   DD   00A4         BRA     MATCH2
                               *
0C7 1A   01       A MATCH7 ORCC    #1
0C9 39                     RTS
```

```
                          *
                          *  GETCHR - IS DESIGNED TO FETCH A SINGLE BYT
                          *           FROM THE CIRCULAR QUEUE BUFFER.
                          *           ROUTINE RETURNS WITH THE CARRY SE
                          *           BUFFER WAS EMPTY.  OTHERWISE THE
                          *           IS CLEAR AND THE CHARACTER IS RET
                          *           IN THE B-REG.
                          *
                          *      CALLING PARAMETERS:    LDX #BCF POINTE
                          *                             JSR GETCHR
                          *
            0086        P GETCHR EQU    *
186 34      20          A        PSHS   Y
)88 10AE    02          A        LDY    2,X       GET DEL POINTER
)8B 10AC    84          A        CMPY   0,X       ;IS INS=DEL?
)8E 27      F1     0081          BEQ    PUTC30    ;YES, BUFFER EMPTY
                          *
)90 E6      A0          A        LDB    ,Y+       ;GET NEXT CHAR
)92 10AC    04          A        CMPY   4,X       ;AT EOB?
)95 26      03     009A          BNE    GETC30    ;NO
                          *
                          *  SET DEL POINTER TO BOB
                          *
)97 10AE    06          A        LDY    6,X       ;GET BOB POINTER
09A 10AF    02          A GETC30 STY    2,X       ;UPDATE BCF
09D 20      DD     007C          BRA    PUTC20
```

```
                               *
                               *   QUEUE INPUT ROUTINE
                               *     THIS ROUTINE IS DESIGNED TO PUT A CHAR
                               *     INTO A CIRCULAR QUEUE BUFFER. UPON RETU
                               *     IF THE CARRY IS CLEAR, THE CHARACTER WA
                               *     STORED IN THE BUFFER AND THE BUFFER
                               *     POINTERS WERE UPDATED.  OTHERWISE, THE
                               *     CARRY IS SET INDICATING THAT THE BUFFER
                               *     FULL.
                               *
                               *       CALLING PARAMETERS:      LDB CHAR
                               *                                LDX #BCF POIN
                               *                                JSR PUTCHR
                               *
                               *     NOTE: THE B-REG IS SAVED.
                               *
           0065          P PUTCHR EQU     *
065 34     20            A        PSHS    Y          ;SAVE REGISTERS
067 10AE 84              A        LDY     0,X        ;GET INS POINTER
06A E7     A0            A        STB     ,Y+        ;STORE CHAR
                               *
06C 10AC 04              A        CMPY    4,X        ;IS INS=EOB?
06F 26     03     0074            BNE     PUTC10     ;NO
                               *
                               *   SET INSERT POINTER = BOB
                               *
071 10AE 06              A        LDY     6,X        ;GET BOB
074 10AC 02              A PUTC10 CMPY    2,X        ;IS INS=DEL?
077 27     08     0081            BEQ     PUTC30     ;YES, BUFFER IS FULL
                               *
079 10AF 84              A        STY     0,X        ;UPDATE BCF
07C 35     20            A PUTC20 PULS    Y
07E 1C     FE            A        ANDCC   #$FE       ;RETURN CC
080 39                            RTS
                               *
081 35     30            A PUTC30 PULS    X,Y
083 1A     01            A        ORCC    #1         ;RETURN CS
085 39                            RTS
```

```
0059 27    09   0064         BEQ    CMIN70   ;NO
005B C6    32      A         LDB    #BADCTR  ;YES, ERROR
005D 20    02   0061         BRA    CMIN60
                       *
                       *  ERROR - UNKNOWN COMMAND
                       *
005F C6    30      A CMIN50 LDB    #UNKCMD
0061 BD    015B    P CMIN60 JSR    ERROR
0064 39              CMIN70 RTS
```

```
                                *
                                *  COMMAND INTERPRETOR
                                *
P 0000 0F    A9        A CMINTP CLR    OVRFLW   ;RESET BUF OVERFLOW
P 0002 8E    01AA      A        LDX    #EXBUFR
P 0005 C6    24        A        LDB    #BUFLEN
P 0007 86    20        A        LDA    #$20     ;BLANK OUT BUFFER
P 0009 A7    80        A CMIN15 STA    ,X+
P 000B 5A                       DECB
P 000C 26    FE   0009          BNE    CMIN15
                                *
P 000E 108E  01AA      A        LDY    #EXBUFR  ;EXEC BUFFER AREA
P 0012 86    24        A        LDA    #BUFLEN  ;MAX COMMAND STRING
P 0014 8E    045E      A CMIN20 LDX    #INBCF
P 0017 BD    0086      P        JSR    GETCHR   ;GET CHAR FROM BUF
P 001A 25    15   0031          BCS    CMIN37   ;BUFFER EMPTY
                                *
P 001C E7    A0        A        STB    ,Y+      ;SAVE CHAR
P 001E C1    0A        A        CMPB   #STRTRM  ;END OF STRING?
P 0020 27    1B   003D          BEQ    CMIN40   ;YES
                                *
P 0022 4A                       DECA            ;MAX COUNT REACHED
P 0023 26    EF   0014          BNE    CMIN20   ;NO
                                *
                                *  ERROR - THE COMMAND STRING IS TOO LONG.
                                *   ABORT THIS STRING.
                                *
P 0025 8E    045E      A CMIN35 LDX    #INBCF
P 0028 BD    0086      P        JSR    GETCHR   ;GET NEXT CHAR
P 002B 25    04   0031          BCS    CMIN37   ;NONE, BUFFER NOW EMPT
P 002D C1    0A        A        CMPB   #STRTRM  ;END OF STRING CHAR?
P 002F 26    F4   0025          BNE    CMIN35   ;KEEP FLUSHING Q
                                *
P 0031 C6    0D        A CMIN37 LDB    #$0D
P 0033 E7    A0        A        STB    ,Y+
P 0035 C6    0A        A        LDB    #$0A
P 0037 E7    A0        A        STB    ,Y+
                                *
P 0039 C6    FF        A        LDB    #$FF
P 003B D7    A9        A        STB    OVRFLW
                                *
                                *  PARSE THE STRING
                                *
P 003D 8E    0531      P CMIN40 LDX    #CMDTBL  ;PTR TO COMMAND TABLE
P 0040 108E  01AA      A        LDY    #EXBUFR  ;PTR TO CUR COMMAND
P 0044 C6    02        A        LDB    #2       ;LENGTH OF COMMAND
P 0046 BD    009F      P        JSR    MATCH    ;VALID COMMAND?
P 0049 25    14   005F          BCS    CMIN50   ;NO
                                *
P 004B EC    84        A        LDD    0,X      ;GET REL OFST TO ROUTI
P 004D 30    8B        A        LEAX   D,X      ;MAKE ABSOLUTE
                                *
P 004F D6    A3        A        LDB    PROBER   ;PASS IF THIS IS 'SE'
P 0051 0F    A3        A        CLR    PROBER   ;CLEAR CODE
P 0053 0F    A6        A        CLR    ESTATE   ;CLEAR ERROR FLAG
                                *
P 0055 AD    84        A        JSR    0,X      ;VECTOR TO PROCESSOR
P 0057 0D    A9        A        TST    OVRFLW   ;DID BUF OVERFLOW OCCU
```

```
*
******************
*
*     NAME:      COMMAND PROCESSOR
*
*     FUNCTION:  TO INTERPRET COMMANDS SENT BY
*                THE HOST AND EXECUTE ITS
*                INSTRUCTIONS.
*
*     CALLING SEQUENCE:
*                            JMP CMINTP
*
*     NOTE:  WHENEVER THE STATE OF "INCNT" BEC
*            NON-ZERO, THIS MEANS THAT A COMMA
*            IS WAITING TO BE INTERPRETED IN T
*            INPUT QUEUE.
*
*      REV          DATE         BY      REASON FO
*      ←←←          ←←←←         ←←      ←←←←←←←←←
*      00         10/22/81      SJF      INITIAL R
*
*
```

```
00A2    A CURMOD EQU    162       ;CURRENT OPERATION MOD
          *
00AE    A OUTCNT EQU    174       ;OUTPUT MESSAGE COUNT
04D4    A OUTBUF EQU    1236      ;OUTPUT BUFFER
0539    A OUTEND EQU    1337
          *
          *  BUFFER CONTROL FIELDS (BCF)
          *
          *    FORMAT:   NEXT AVAIL RMB 2
          *                 LAST:   RMB 2
          *                 END OF BUFFER: RMB 2
          *                 BEG OF BUFFER:  RMB 2
          *
045E    A INBCF  EQU    1118      ;INPUT BCF
0466    A OUTBCF EQU    1126      ;OUTPUT BCF
00AF    A INCNT  EQU    175       ;INPUT MSG COUNT
01AA    A EXBUFR EQU    426       ;NEXT COMMAND BUFFER
00A0    A MTCNT  EQU    160       ;GET MATCH COUNT
00CF    A SRCPTR EQU    207
00A6    A ESTATE EQU    166       ;SET WHEN ERROR OCCURS
00A7    A ABFLAG EQU    167       ;=$43 WHEN GIVEN
00A8    A DEMODE EQU    168       ;SET WHEN D,E COORD
009E    A VALSGN EQU    158       ;SET WHEN SIGN OF COOR
00BF    A NUMBUF EQU    191       ;STORAGE BUF FOR NUMER
00C5    A TEMPX  EQU    197       ;TEMP STORAGE FOR X BI
00C7    A TEMPY  EQU    199       ;SAME FOR Y
00C4    A XDSIGN EQU    196       ;SIGN OF X OR D COORD
00C9    A YESIGN EQU    201       ;SIGN OF Y OR E COORD
00A9    A OVRFLW EQU    169       ;SET WHEN COMMAND OVER
009F    A ONOFFL EQU    159       ;ONLINE/OFFLINE FLAG
01D3    A CXYPOS EQU    467       ;X,Y FORMATTED BUFFER
01E1    A CDEPOS EQU    481       ;D,E FORMATTED BUFFER
0094    A CXSAVE EQU    148       ;SAVE CURRENT X POS
0096    A CYSAVE EQU    150       ;SAVE CURRENT Y POS
0077    A ZSAVE  EQU    119       ;SAVE Z DIRECTION
          *
008C    A SREFAX EQU    140       ;SAVE RAX POS
008E    A SREFAY EQU    142       ;SAVE RAY POS
0090    A SREFBX EQU    144       ;SAVE RBX POS
0092    A SREFBY EQU    146       ;SAVE RBY POS
          *
          *  HARDWARE EQUATES
          *
E710    A PRSWIT EQU    $E710     ;CLOSE TOUCHDOWN SWITC
```

```
                              *
                              *  OPERATIONS MODE EQUATES - 'CURMOD' CAN TAK
                              *                      ANY ONE OF THE FOLLOWING STA
                              *
        0003     A IDLMOD EQU     $03        ;IDLE MODE
        0002     A TSTMOD EQU     $02        ;TEST MODE
        0001     A STPMOD EQU     $01        ;STEP/MANUAL MODE
        0000     A AUTMOD EQU     $00        ;AUTOMATIC MODE

                              *
                              *  THE FOLLOWING EQUATE TABLE IS THE BIT
                              *  CONFIGUARATION OF EACH ERROR FLAG ABOVE.
                              *
        0020     A ZBIT   EQU     $20        ;ZDIR = BIT 5
        0010     A BBIT   EQU     $10        ;DEVBSY = BIT 4
        0008     A OBIT   EQU     $08        ;ONOFFL = BIT 3
        0004     A EBIT   EQU     $04        ;PROBER = BIT 2
        0003     A MBIT   EQU     $03        ;CURMOD = BITS 1 AND 0

                              *
                              *  MISC. EQUATES
                              *
        000A     A STRTRM EQU     $0A        ;STRING TERMINATOR (LF
        0024     A BUFLEN EQU     36         ;MAXLENGTH OF COMMAND
        0000     A DONTCR EQU     $00        ;CONT CARE CHAR
        00FF     A EOTCHR EQU     $FF        ;END OF TABLE
        0004     A BOFFST EQU     $4         ;CAMERA OFFSET KNOWN B
        4E20     A PARKX  EQU     20000      ;PARK POSITION X
        4E20     A PARKY  EQU     20000      ;PARK POSITION Y
                              *
                              *    LOW MEMORY EQUATES
                              *

        0036     A CX     EQU     $36        ;CURRENT ABS LOC X
        0039     A CY     EQU     $39        ;CURRENT ABS LOC Y
        003C     A NX     EQU     $3C        ;NEXT ABS LOC X
        003F     A NY     EQU     $3F        ;NEXT ABS LOC Y
        0041     A DD     EQU     $41        ;D EQUATION VALUE
        0045     A EE     EQU     $45        ;E EQUATION VALUE
        005E     A NZ     EQU     $5E        ;NEXT ABS Z LOC
                              *
        0100     A RAX    EQU     $100       ;X ABS LOC REF A
        0102     A RAY    EQU     $102       ;Y ABS LOC REF A
        0104     A RBX    EQU     $104       ;X ABS LOC REF B
        0106     A RBY    EQU     $106       ;Y ABS LOC REF B
                              *
        0060     A MOVEZ  EQU     $60        ;Z MOVE COMPLETE FLAG
        00B2     A UOFSET EQU     178        ;CAMERA OFFSET KNOWN F
        0078     A XOFFS  EQU     120        ;X CAMERA OFFSET
        007A     A YOFFS  EQU     122        ;Y CAMERA OFFSET


                              *
                              *  THE FOLLOWING FLAGS MAKE UP THE STATUS BYT
                              *  THAT IS SENT TO THE CONTROLLER UPON REQUES
                              *
        00A4     A ZDIR   EQU     164        ;CURRENT Z DIRECTION
        00A3     A PROBER EQU     163        ;PROBER STATUS CODE
```

```
          *        93             X,Y
          *        94             Z
          *        95             X,Z
          *        96             Y,Z
          *        97             X,Y,Z
          *
          *
00A0    A AXISIN EQU    $A0      ;BASE ADDR FOR AXIS IN
          *
          *   TYPES OF AXIS INIT ERRORS ARE AS FOLLOWS:
          *
          *       VALUE(HEX)    AXISES IN ERROR
          *        A1             X
          *        A2             Y
          *        A3             X,Y
          *        A4             Z
          *        A5             X,Z
          *        A6             Y,Z
          *        A7             X,Y,Z
          *

```

```
                 NAM    COMAND
                 OPT    REL,CRE,NOG

                 TTL    COMMAND PROCESSOR
          *
          *  INTERNAL DEFINITIONS
          *
                 XDEF   CMINTP,PUTCHR,GETCHR
                 XDEF   INTBCF,FORMST,OTCRLF
                 XDEF   AUTPRB,MANPRB,TSTPRB
                 XDEF   UPPROB,DNPROB,HOPROB
                 XDEF   ABSET,MATCH,RERROR,MVPARK
          *
          *   EXTERNAL REFERENCES
          *
                 XREF   CUROFF,ONLTE
                 XREF   TOUCHD,CASCB,OFFLTE
                 XREF   CBASC,SFLOAT,CXYPF,MVPOS
                 XREF   JOG,ZTABLE,CDEV,FPSUB
                 XREF   DSPL,TCLRDP,CREFD,ENTER
                 XREF   FLSHYN,UNLDKY,LOADKY
          *
          *   KEYBOARD LIGHT EQUATES
          *
0045    A LAUTO  EQU    $45       ;AUTO
0042    A LTEST  EQU    $42       ;TEST
0040    A LSTEP  EQU    $40       ;STEP
0033    A LUPDWN EQU    $33       ;UP/DOWN
0030    A LABLGN EQU    $30       ;A/B ALIGN
          *
          *  PROBER NON-FATAL ERROR COMMANDS
          *
0030    A UNKCMD EQU    $30       ;UNRECOGNIZED COMMAND
0031    A INVCHR EQU    $31       ;INVALID CHAR IN COMMA
0032    A BADCTR EQU    $32       ;IMPROPER TERMINATOR
0033    A INVARG EQU    $33       ;INVALID COMMAND ARGUM
0034    A WRGMOD EQU    $34       ;INVALID COMMAND FOR C
0035    A UNDFAB EQU    $35       ;HYBRID A/B POINTS NOT
0036    A NOFSET EQU    $36       ;CAMERA OFFSET NOT SET
          *
          *  PROBER FATAL ERROR COMMANDS
          *
0080    A OPABRT EQU    $80       ;OPERATOR ABORT
0081    A IEEEER EQU    $81       ;IEEE BUS ERROR
0082    A UNKINT EQU    $82       ;UNKNOWN INTERRUPT
0083    A LIMERR EQU    $83       ;AXIS LIMIT ERROR
0084    A TRSHER EQU    $84       ;THRESHOLD ERROR
0085    A APUERR EQU    $85       ;APU ERROR
0086    A AXISER EQU    $86       ;AXIS ERROR CONTROL
0087    A DSKERR EQU    $87       ;DISK ERROR
          *
0090    A AXISTO EQU    $90       ;TIME OUT BASE ADDR
          *
          *   TYPES OF TIME OUT ERRORS ARE AS FOLLOWS:
          *
          *        VALUE(HEX)     AXISES IN ERROR
          *         91               X
          *         92               Y
```

```
   0029 KTEST  00047*00515
   0026 KUNLOD 00044*00509
   0025 KUPDWN 00043*00507
   E070 LIGHT  00089*00098
   0034 LLOAD  00033*00342 00363
   0043 LLSTOP 00031*00159 00169
 P 0165 LOAD10 00352 00360*
 P 0168 LOAD15 00348 00358 00362*
 P 016C LOAD50 00365*
DP 0143 LOADKY 00012 00341*00526
 P 0271 LOADMS 00345 00494*
   0032 LOFSET 00034*00318 00329
   0041 LRUN   00030*00119 00161 00171
   0035 LUNLOD 00032*00223 00226
R       MANPRB 00022*00247
R       MATCH  00024*00377
R       MVPARK 00025*00224 00343
R       OFFLTE 00021*00160 00168 00225 00328 00362
   007E OFFSTP 00083*00350
R       OFLNE  00025*00256
 P 0122 OFST30 00310*00365
 P 0120 OFSTKY 00308*00524
R       ONLTE  00021*00118 00158 00170 00222 00317 00341
   009F ONOFFL 00075*00139 00380 00383 00388
   00A1 ONOFSV 00082*00156 00167 00381 00387
R       ONSTOP 00019*
   0080 OPABRT 00065*00180 00194
   E710 PRSWIT 00092*00299
 P 011C PRTR10 00299*
 P 011F PRTR20 00293 00297 00300*
 P 0112 PRTRKY 00292*00528
R       RERROR 00024*00136 00181 00195
R       RSTART 00024*00182
 P 006A RUNKY  00167*00238 00504
R       START  00020*
 P 00D7 STEPKY 00243*00514
 P 005D STOPKY 00155*00502
 P 0207 STPMSG 00463 00480*
R       TCLRDP 00020*00134 00283 00347
 P 00E8 TEST10 00256*00264
 P 00FA TEST20 00259 00265*
 P 00E3 TESTKY 00253*00516
 P 0211 TSTMSG 00469 00482*
R       TSTPRB 00022*00253
DP 00B7 UNLDKY 00012 00220*00510
 P 0251 UNLMSG 00221 00490*
   00B2 UOFSET 00073*00100
 P 00B4 UPDN10 00213 00216*
 P 00AD UPDNKY 00212*00508
R       UPPROB 00021*00215
   00A4 ZDIR   00072*00212 00292
 P 0225 BUSMSG 00132 00486*
R       CAMOFF 00025*00320
R       CBHEX  00023*00418 00421 00431
R       CMINTP 00020*00143
 P 013E COFF1  00323 00328*
DP 012B COFFST 00013 00308 00317*00355
   00A2 CURMOD 00080*00176 00193 00231 00243 00262 00295 00454
R       CUROFF 00023*00190
R       DELAY2 00019*00108
 P 019A DISP10 00411*00413
 P 01B8 DISP30 00430*00439
 P 0191 DISPLY 00282 00406*
R       DNPROB 00021*00216
 P 01E3 DS2A   00455 00460*
 P 01ED DS2B   00461 00466*
 P 01F7 DS2C   00467 00472*
R       DSKOFF 00019*00112
 P 010B DSNXKY 00282*00520
   01F3 DSPADR 00076*00277 00417 00420 00428 00443
R       DSPL   00020*00131 00184 00220 00344 00444 00456 00462 00468
               00472
 P 01D8 DSPMOD 00120 00148 00454*
 P 01FC DSPRTN 00458 00464 00470 00475*
R       ENTER  00023*00269
   00FF EOTCHR 00059*00529
DP 002E EXCNTR 00012 00125*00140 00142 00149
DP 0000 EXEC   00012 00094*
   0046 EXEC10 00130 00139*
 P 0055 EXEC30 00127 00147*
 P 0058 EXEC50 00145 00148*
R       FLSHYN 00023*00187
   E130 FORCE  00090*00103
 P 007B FTLABT 00137 00180*
   01F1 HEXRES 00078*00432 00434
R       HOPROB 00022*00191 00354
   0003 IDLMOD 00058*00177 00192 00232 00244 00263
 P 021B IDLMSG 00473 00484*
   0081 IEEEER 00066*00135
R       IKBPIA 00019*00105
 P 00FB INADKY 00269*00518
   00AF INCNT  00074*00141 00144
 P 023A INPMSG 00270 00488*
   0020 KABLGN 00050*00521
   0030 KABRT  00042*00206 00258 00311 00322 00357 00505
   002A KAUTO  00045*00511
   0041 KDSPNX 00049*00519
   0010 KEY    00071*00121 00126 00205 00257 00310 00321 00356 00375
               00389
 P 016E KEYPRC 00147 00374*
 P 018E KEYRTN 00378 00389*
 P 0289 KEYTBL 00374 00501*
   0031 KINPAD 00048*00517
   0022 KLOAD  00051*00525
   002D KLSTOP 00040*00501
   0021 KOFSET 00053*00523
   0024 KPTRIG 00052*00527
   002C KRUN   00041*00503
   0028 KSTEP  00046*00513
```

```
00497                         *
00498                         *  THE FOLLOWING IS A RELATIVE JUMP TABLE
00499                         *  FOR ALL KEY PROCESSOR ROUTINES
00500                         *
00501P 0289      2D      A KEYTBL FCB     KLSTOP    ;STOP KEY
00502P 028A      FDD3    A        FDB     STOPKY-*
00503P 028C      2C      A        FCB     KRUN      ;RUN KEY
00504P 028D      FDDD    A        FDB     RUNKY-*
00505P 028F      30      A        FCB     KABRT     ;ABORT KEY
00506P 0290      FDE5    A        FDB     ABRTKY-*
00507P 0292      25      A        FCB     KUPDWN    ;UP/DOWN KEY
00508P 0293      FE1A    A        FDB     UPDNKY-*
00509P 0295      26      A        FCB     KUNLOD    ;UNLOAD KEY
00510P 0296      FE21    A        FDB     UNLDKY-*
00511P 0298      2A      A        FCB     KAUTO     ;AUTOKEY
00512P 0299      FE2F    A        FDB     AUTOKY-*
00513P 029B      28      A        FCB     KSTEP     ;STEP KEY
00514P 029C      FE3B    A        FDB     STEPKY-*
00515P 029E      29      A        FCB     KTEST     ;TEST KEY
00516P 029F      FE44    A        FDB     TESTKY-*
00517P 02A1      31      A        FCB     KINPAD    ;INPUT ADDR KEY
00518P 02A2      FE59    A        FDB     INADKY-*
00519P 02A4      41      A        FCB     KDSPNX    ;DISPLAY NEXT ADDR KEY
00520P 02A5      FE66    A        FDB     DSNXKY-*
00521P 02A7      20      A        FCB     KABLGN    ;A/B ALIGN KEY
00522P 02A8      FDF5    A        FDB     ABLNKY-*
00523P 02AA      21      A        FCB     KOFSET    ;OFFSET KEY
00524P 02AB      FE75    A        FDB     OFSTKY-*
00525P 02AD      22      A        FCB     KLOAD     ;LOAD KEY
00526P 02AE      FE95    A        FDB     LOADKY-*
00527P 02B0      24      A        FCB     KPTRIG    ;PROBE TRIGGER KEY
00528P 02B1      FE61    A        FDB     PRTRKY-*
00529P 02B3      FF      A        FCB     EOTCHR    ;END OF TABLE
00530                         *
00531                                 END
TOTAL ERRORS 00000--00000
TOTAL WARNINGS 00000--00000


   00A7 ABFLAG 00081*00200 00324 00326
   001F ABFLEN 00057*00409
 P 00AC ABLN40 00202 00208*
 P 009D ABLNKY 00200*00522
 P 0083 ABRT10 00178 00184*
 P 009C ABRT20 00188 00196*
 P 0075 ABRTKY 00176*00207 00260 00275 00312 00506
 P 0265 ABRTMS 00185 00492*
R       ABSET  00024*00204 00360
   01F5 ADRBUF 00077*00407 00419 00422 00426 00445
 P 01FD AUTMSG 00457 00478*
 P 00D3 AUTO10 00238*00248
   00D6 AUTO20 00233 00236 00239*00245 00254
 P 00C8 AUTOKY 00231*00512
R       AUTPRB 00022*00235
   E120 BFPIA  00091*00114 00116
   0004 BOFFST 00060*00201 00325
   00AB BUSERR 00079*00129
```

```
00478P 01FD       41        A AUTMSG FCC     /AUTO MODE/
00479P 0206       0D        A        FCB     $0D
00480P 0207       53        A STPMSG FCC     /STEP MODE/
00481P 0210       0D        A        FCB     $0D
00482P 0211       54        A TSTMSG FCC     /TEST MODE/
00483P 021A       0D        A        FCB     $0D
00484P 021B       49        A IDLMSG FCC     /IDLE MODE/
00485P 0224       0D        A        FCB     $0D
00486P 0225       49        A BUSMSG FCC     /IEEE-68488 BUS ERROR/
00487P 0239       0D        A        FCB     $0D
00488P 023A       49        A INPMSG FCC     /INPUT ADDRESS:         /
00489P 0250       0D        A        FCB     $0D
00490P 0251       55        A UNLMSG FCC     /UNLOADING PROBE .../
00491P 0264       0D        A        FCB     $0D
00492P 0265       41        A ABRTMS FCC     /ABORT TEST?/
00493P 0270       0D        A        FCB     $0D
00494P 0271       53        A LOADMS FCC     /SECURE HYBRID IN SOCKET/
00495P 0288       0D        A        FCB     $0D
```

```
00402                          *
00403                          *   VALIDATE STRING
00404                          *
00405                          *      VALIDATE THE STRING TO INSURE THAT IT
00406                          *   COMPLETELY NUMERIC.  IF IN THE "DEMODE",
00407                          *   FIRST CHARACTER OF THE STRING WILL HAVE T
00408                          *   OPTION OF BEING A "+" OR "-" SIGN.
00409                          *
00410                          *         CALLING SEQUENCE:     LDY STRING PTR
00411                          *                               LDB # OF CHAR (
00412                          *                               JSR VALNUM
00413                          *
00414                          *         UPON RETURN:     CC - VALID NUMERIC S
00415                          *                           B - SIGN (0=POS,FF=
00416                          *                           Y - PTR TO NEXT CHA
00417                          *                               PASSED STRING.
00418                          *                    OR
00419                          *                          CS - INVALID NUMERIC
00420                          *   NOTE: THE PURE NUMERIC STRING IS STORED I
00421                          *              NUMBUF (5 BYTES).
00422                          *
00423               00CA     P VALNUM EQU    *
00424P 00CA 34    02         A        PSHS   A           ;SAVE A REG
00425P 00CC 0F    9E         A        CLR    VALSGN      ;ASSUME POS
00426                          *
00427P 00CE A6    A0         A VAL010 LDA    ,Y+         ;GET POSSIBLE SIGN CHA
00428P 00D0 81    20         A        CMPA   #$20        ;LEADING BLANK?
00429P 00D2 27    FA    00CE          BEQ    VAL010
00430                          *
00431P 00D4 0D    A8         A        TST    DEMODE      ;IN DE MODE?
00432P 00D6 27    0C    00E4          BEQ    VAL030      ;NO NEED TO CHECK FOR
00433                          *
00434P 00D8 81    2B         A        CMPA   #$2B        ;IS IT POS?
00435P 00DA 27    0A    00E6          BEQ    VAL050      ;YES
00436                          *
00437P 00DC 81    2D         A        CMPA   #$2D        ;IS IT NEG?
00438P 00DE 26    04    00E4          BNE    VAL030      ;NO, ASSUME POS
00439                          *
00440P 00E0 03    9E         A        COM    VALSGN      ;REPORT MINUS
00441P 00E2 20    02    00E6          BRA    VAL050
00442P 00E4 31    3F         A VAL030 LEAY   -1,Y        ;BACKUP ONE CHAR
00443P 00E6 8E    00BF       A VAL050 LDX    #NUMBUF     ;STORAGE BUFFER
00444P 00E9 A6    A0         A VAL060 LDA    ,Y+         ;GET CHAR
00445P 00EB 81    30         A        CMPA   #$30        ;VALID DIGIT?
00446P 00ED 25    10    00FF          BCS    VALERR      ;NO
00447P 00EF 81    3A         A        CMPA   #$3A
00448P 00F1 24    0C    00FF          BCC    VALERR      ;NO
00449                          *
00450P 00F3 A7    80         A        STA    ,X+         ;STORE DIGIT
00451P 00F5 5A                        DECB
00452P 00F6 26    F1    00E9          BNE    VAL060      ;CONTINUE
00453                          *
00454P 00F8 35    02         A        PULS   A
00455P 00FA D6    9E         A        LDB    VALSGN      ;PASS SIGN
00456P 00FC 1C    FE         A        ANDCC  #$FE
00457P 00FE 39                        RTS
00458                          *
00459P 00FF 35    02         A VALERR PULS   A
```

```
00460F 0101 1A   01        A         ORCC    #1
00461F 0103 39                       RTS
00462
```

```
00464                         *
00465                         *  INITIALIZE BUFFER CONTROL FIELD
00466                         *
00467                         *      CALLING PARAMETERS:   LDX    #BCFPTR
00468                         *                            LDD    BEG OF BUFF
00469                         *                            LDY    END OF BUFF
00470                         *                            JSR    INTBCF
00471                         *
00472             0104      P INTBCF EQU     *
00473P 0104 ED    84        A        STD     0,X       ;SET NEXT AVAIL
00474P 0106 ED    02        A        STD     2,X       ;SET LAST FULL
00475P 0108 ED    06        A        STD     6,X       ;SET B.O.B.
00476P 010A 10AF  04        A        STY     4,X       ;SET E.O.B.
00477P 010D 39                       RTS
00478
00479                         *
00480                         *  OUTPUT CR/LF TO BCF
00481                         *
00482                         *      CALLING PARAMETERS          LDX #BCFP
00483                         *                                  JSR OTCRL
00484                         *
00485             010E      P OTCRLF EQU     *
00486P 010E 34    04        A        PSHS    B
00487P 0110 C6    0D        A        LDB     #$0D
00488P 0112 BD    0065      P        JSR     PUTCHR    ;SAVE CR
00489P 0115 C6    0A        A        LDB     #$0A
00490P 0117 BD    0065      P        JSR     PUTCHR    ;SAVE LF
00491P 011A 35    04        A        PULS    B
00492P 011C 39                       RTS
```

```
00494                             *
00495                             *  NAME:   LOCATE
00496                             *
00497                             *  FUNCTION:  TO LOCATE A REFERENCE POINT. TH
00498                             *             ROUTINE WILL JOG TO THE REF POI
00499                             *             LOCATION AND VERIFY THE POSITIO
00500                             *             CORRECT.
00501                             *
00502                             *   CALLING SEQUENCE:     LDX  X POSITION
00503                             *                         LDY  Y POSITION
00504                             *                         JSR  LOCATE
00505                             *
00506                             *  UPON RETURN     IF CC - X REG = CURRENT X
00507                             *                           Y REG = CURRENT Y
00508                             *                  ELSE CS - USER ABORTED
00509                             *
00510                             *   NOTE: IF CC - CX AND CY ARE UPDATED
00511                             *
00512P 011D 9F   3C        A LOCATE STX    NX
00513P 011F 109F 3F        A        STY    NY
00514P 0122 BD   01C2      P        JSR    UPALWY
00515P 0125 BD   0000      A        JSR    MVPOS
00516                             *
00517P 0128 BD   0000      A LOC010 JSR    DSPL      ;DISPLAY ON TARGET?
00518P 012B      0513      P        FDB    ONTRGM    ;MESSAGE
00519                             *
00520P 012D BD   0000      A        JSR    FLSHYN
00521P 0130 27   10   0142          BEQ    LOCRTN    ;YES PRESSED
00522P 0132 2B   0B   013F          BMI    LOCRT1    ;ABORT PRESSED
00523                             *
00524P 0134 BD   0000      A        JSR    DSPL      ;DISPLAY "MOVE TO
00525P 0137      051E      P        FDB    MOVMSG    ;TEST POINT"
00526                             *
00527P 0139 4F                      CLRA
00528P 013A BD   0000      A        JSR    JOG
00529P 013D 27   E9   0128          BEQ    LOC010    ;ENTER WAS PRESSED
00530                             *
00531P 013F 1A   01          LOCRT1 SEC
00532P 0141 39                      RTS
00533P 0142 9E   36        A LOCRTN LDX    CX        ;PASS NEW POS
00534P 0144 109E 39        A        LDY    CY
00535P 0147 39                      RTS
00536                             *
```

```
0538                        *
0539                        *   THE FOLLOWING ROUTINE WILL MOVE THE PROBE
  10                        *   TO THE PARK POSITION SO THAT THE NEXT
0541                        *   HYBRID MAY BE LOADED.
0542                        *
0543P 0148 8E   4E20      A MVPARK LDX    #PARKX    ;GET PARKPOS
0544P 014B 108E 4E20      A        LDY    #PARKY
0545P 014F 9F   3C        A        STX    NX
0546P 0151 109F 3F        A        STY    NY
0547P 0154 BD   01C2      P        JSR    UPALWY
0548P 0157 BD   0000      A        JSR    MVPOS     ;GO TO PARK
0549P 015A 39                      RTS
0550                        *
```

```
0552                               *
0553                               *  THE FOLLOWING CODE IS THE COMMON ERROR
0554                               *  HANDLER. IT WILL SAVE THE ERROR CODE AND
0555                               *  SET THE ERROR STATE FLAG TO ACTIVE. THE
0556                               *  ERROR IS NOT REPORTED IN THE OFFLINE MODE.
0557                               *
0558                               *   CALLING SEQUENCE:    LDB   ERROR CODE
0559                               *                        JSR   ERROR
0560                               *
0561             015B        P ERROR   EQU    *
0562P 015B 0D    9F          A         TST    ONOFFL      ;IN OFFLINE MODE?
0563P 015D 26    06    0165            BNE    ERRTN       ;YES
0564                               *
0565P 015F D7    A3          A RERROR  STB    PROBER
0566P 0161 C6    FF          A         LDB    #$FF
0567P 0163 D7    A6          A         STB    ESTATE
0568                               *
0569P 0165 1A    01          A ERRTN   ORCC   #1
0570P 0167 39                          RTS
```

```
                             *
                             *  THE FOLLOWING ARE THE COMMAND PROCESSORS
                             *

                             *
                             *  GET MESSAGE PROCESSOR
                             *
0168 BD   0000     A GETMSG JSR    DSPL      ;DISPLAY TO KEYBOARD
016B      01AC     A        FDB    EXBUFR+2
                             *
016D BD   0000     A        JSR    TCLRDP    ;WAIT FOR USER ACK
0170 39                     RTS
                             *
                             *  PROBE MODESET TO AUTOMATIC
                             *
                             *   AT ANY TIME, THE USER MAY CHANGE MODE OF
                             *  OPERATION TO AUTOMATIC. THE ONLY TIME THA
                             *  THIS IS PROHIBITED IS IF THE CURRENT MODE
                             *  OF OPERATION IS THE TEST MODE. ENTRY INTO
                             *  THIS ROUTINE OCCURS BY EITHERPRESSING THE
                             *  AUTO KEY OR BY DECODING A 'M0' COMMAND BY
                             *  THE CONTROLLER.
                             *
                             *     CALLING SEQUENCE:   JSR AUTPRB
                             *
                             *     RETURN:    CC - IF VALID CHANGE
                             *

0171 96   A2       A AUTPRB LDA    CURMOD    ;GET CURRENT MODE
0173 81   00       A        CMPA   #AUTMOD   ;ALREADY AUTO?
0175 27   0F   0186         BEQ    AUTPRT    ;YES
                             *
0177 81   02       A        CMPA   #TSTMOD   ;VALID CHANGE?
0179 27   3C   01B7         BEQ    PRBERR    ;NO
                             *
017B BD   0000     A        JSR    CUROFF    ;TURN OFF CURRENT MODE
017E 86   00       A        LDA    #AUTMOD
0180 97   A2       A        STA    CURMOD    ;UPDATE NEW MODE
0182 BD   0000     A        JSR    ONLTE
0185      45       A        FCB    LAUTO
0186 1C   FE       A AUTPRT ANDCC  #$FE
0188 39                     RTS

                             *
                             *  PROBE MODE SET TO MANUAL
                             *
                             *   THIS ROUTINE WILL FOLLOW THE SAME RULES A
                             *   IN THE AUTOMATIC TESTMODE.  THIS MODE MAY
                             *   ENTERED BY ONE O9F TWO METHODS: 1)BY PRES
                             *   THE 'STEP' KEY OR BY AN 'M1' COMMAND
                             *   GENERATED BY THE CONTROLLER
                             *
                             *      CALLING SEQUENCE:    JSR MANPRB
                             *
                             *      RETURN    CC- IF VALID MODE CHANGE
                             *
0189 96   A2       A MANPRB LDA    CURMOD
018B 81   01       A        CMPA   #STPMOD   ;SAME MODE
```

```
P 018D 27   0F   019E         BEQ     MANPRT
                         *
P 018F 81   02      A         CMPA    #TSTMOD   ;IN TEST MODE?
P 0191 27   24   01B7         BEQ     PRBERR    ;YES
                         *
P 0193 BD   0000    A         JSR     CUROFF    ;TURN OFF CURRENT MODE
P 0196 86   01      A         LDA     #STPMOD
P 0198 97   A2      A         STA     CURMOD    ;SET TO NEW MODE
                         *
P 019A BD   0000    A         JSR     ONLTE     ;TURN ON NEW LIGHT
P 019D      40      A         FCB     LSTEP
P 019E 20   E6   0186 MANPRT BRA     AUTPRT

                         *
                         *  PROBE MODE SET TO TEST
                         *
                         *   ONLY IF THE CURRENT MODE OF THE BONDER IS
                         *   IDLE CAN THE TEST MODE BE ENTERED. THIS
                         *   ROUTINE IS TRIGGERED WHENEVER THE 'TEST'
                         *   ON THE KEYBOARD IS PRESSED OR IF THE
                         *   CONTROLLER TRANSMITS A 'M2' CODE.
                         *
                         *     CALLING SEQUENCE:  JSR TSTPRB
                         *
                         *     RETURN:   CC - IF VALID MODE CHANGE
                         *
P 01A0 96   A2      A TSTPRB LDA     CURMOD    ;GET CURRENT MODE
P 01A2 81   02      A        CMPA    #TSTMOD   ;ALREADY IN TEST?
P 01A4 27   0F   01B5        BEQ     TSTRTN    ;YES
                         *
P 01A6 81   03      A        CMPA    #IDLMOD   ;IN IDLE?
P 01A8 26   0D   01B7        BNE     PRBERR    ;NO
                         *
P 01AA BD   0000    A        JSR     CUROFF    ;TURN OFF CURRENT LIGH
P 01AD 86   02      A        LDA     #TSTMOD
P 01AF 97   A2      A        STA     CURMOD
P 01B1 BD   0000    A        JSR     ONLTE     ;TURN ON TEST LITE
P 01B4      42      A        FCB     LTEST
P 01B5 20   CF   0186 TSTRTN BRA     AUTPRT
                         *
                         *  ERROR - WRONG MODE FOR REQUEST
                         *
P 01B7 C6   34      A PRBERR LDB     #WRGMOD
P 01B9 7E   015B    P        JMP     ERROR

                         *
                         *  COMMAND TO RAISE THE PROBE
                         *
                         *    THE COMMAND TO RAISE THE PROBE WILL BE
                         *  HONORED IN ANY MODE. BEFORE ANY CHANGE OF
                         *  AN (X,Y) POSITION, AN AUTOMATIC PROBE UP
                         *  COMMAND IS PERFORMED. CURRENTLY, THE PROBE
                         *  PROBE WILL BE RAISED TO ITS MAXIMUM Z POSI
                         *  TION BUT FUTURE ENHANCEMENTS MAY ONLY RAIS
                         *  THE PROBE THE MINIMUM WORK HEIGHT CLEARANC
                         *  LEVEL.
                         *
                         *     CALLING PARAMTERS:  JSR UPPROB
```

```
                    *
          01BC    P UPPROB EQU    *
01BC 96   A2      A        LDA    CURMOD    ;GET CURRENT MODE
01BE 81   03      A        CMPA   #IDLMOD   ;IN IDLE MODE?
01C0 27   1E   01E0        BEQ    DNRTN     ;YES
                    *
01C2 C6   04      A UPALWY LDB    #4        ;RAISE PROBE
01C4 BD   0000    A        JSR    ZTABLE
                    *
01C7 BD   0000    A        JSR    OFFLTE    ;TURN OFF UP/DOWN LIGH
01CA      33      A        FCB    LUPDWN
01CB 0F   A4      A        CLR    ZDIR      ;SET Z DIR TO UP
01CD 39                    RTS
```

```
                               *
                               *  COMMAND TO LOWER THE PROBE
                               *
                               *   EXECUTING THIS ROUTINE WILL LOWER THE
                               *   PROBE UNTIL ULTRA-SONIC PROBE TOUCHDOWN
                               *   HAS BEEN MADE.
                               *
                               *    CALLING PARAMETERS:    JSR DNPROB
                               *
              01CE        P DNPROB EQU     *
P 01CE 96     A2          A        LDA     CURMOD     ;GET CURRENT MODE
P 01D0 81     03          A        CMPA    #IDLMOD    ;IN IDLE?
P 01D2 27     0C     01E0          BEQ     DNRTN      ;YES
                               *
P 01D4 BD     0000        A        JSR     TOUCHD
P 01D7 86     FF          A        LDA     #$FF
P 01D9 97     A4          A        STA     ZDIR
P 01DB BD     0000        A        JSR     ONLTE      ;TURN ON UP/DOWN LIGHT
P 01DE        33          A        FCB     LUPDWN
P 01DF 39                          RTS
                               *
P 01E0 C6     34          A DNRTN  LDB     #WRGMOD    ;SET WRONG MODE ERROR
P 01E2 7E     015B        P        JMP     ERROR
```

```
                                  *
                                  * MOVE PROBE TO (X,Y) POSITION
                                  *
                                  *   THIS ROUTINE HAS SEVERAL TASKS. THIS
                                  *   ROUTINE WILL ALSO HANDLE (D,E) COORDINATE
                                  *   FIRST, THE (X,Y) OR (D,E) COORDINATES ARE
                                  *   GATHERED AND VALIDATED.  NEXT THE NUMBERS
                                  *   CONVERTED INTO A VALID BINARY FORMAT. IF
                                  *   THE NUMBERS ARE INVALID, AN ERROR WILL BE
                                  *   GENERATED UP REQUEST BY THE HOST COMPUTER
                                  *   OTHERWISE, THE PROBER WILL BE MOVED TO TH
                                  *   REQUESTED (X,Y)POS. HOW THIS IS DONE DEPE
                                  *   ON WHAT OPERATION MODE IS REQUESTED.
                                  *
                                  *   MODE 0 = AUTOMATIC - A AUTOMATIC PROBE UP
                                  *                 THEN AN AUTOMATIC MOVE TO (X,Y)
                                  *                 AND THEN FINALLY AND AUTOMATIC
                                  *                 DOWN.
                                  *
                                  *   MODE 1 = MANUAL - EXACTLY AS IN MODE 0 EX
                                  *                 THAT THE USER WILL VERFIFY THAT
                                  *                 CORRECT (X,Y) POSITION. ONCE VE
                                  *                 APROBE DOWN COMMAND WILL BE AUT
                                  *                 GIVEN.
                                  *
                                  *   MODE 2 = TEST - THE ONLY AUTOMATIC MOVEME
                                  *                 PROBE UP COMMAND.  SPECIFIC MOV
                                  *                 (X,Y) OR (D,E) AND PROBE UP/DOW
                                  *                 BE GIVEN TO THE HOST COMPUTER.
                                  *
                                  *   MODE 3 = IDLE - MOVES TO (X,Y) WILL BE IG
                                  *
01E5 96    A2        A XYMOVE LDA      CURMOD      ;VALID OPER MODE?
01E7 81    03        A        CMPA     #IDLMOD
01E9 26    05   01F0          BNE      XYM010      ;YES
                                  *
                                  *  ERROR - CANT OPERATE IN IDLE MODE
                                  *
01EB C6    34        A        LDB      #WRGMOD
01ED 16    00C4 02B4          LBRA     DEMERR
                                  *
01F0 96    A7        A XYM010 LDA      ABFLAG      ;IS CAMERA OFFSET SET?
01F2 85    04        A        BITA     #BOFFST
01F4 26    05   01FB          BNE      XYM020      ;YES
                                  *
01F6 C6    36        A        LDB      #NOFSET
01F8 16    00B9-02B4          LBRA     DEMERR      ;REPORT ERROR
                                  *
01FB 108E 01AB       A XYM020 LDY      #EXBUFR+1 ;START OF STRING
01FF C6    05        A        LDB      #5
0201 BD    00CA      P        JSR      VALNUM      ;VALID NUMBER?
0204 25    26   022C          BCS      XYM050      ;NO
0206 D7    C4        A        STB      XDSIGN      ;SAVE SIGN OF X OR D
                                  *
0208 BD    0000      A        JSR      CASCB
020B       00BF      A        FDB      NUMBUF
020D       05        A        FCB      5
020E       00C5      A        FDB      TEMPX       ;SAVE BINARY RESULT
```

```
                             *
                             *  CHECK FOR PROPER FORMAT OF STRING
                             *
0210 A6   A0        A               LDA     ,Y+        ;GET NEXT CHAR
0212 0D   A8        A               TST     DEMODE     ;IN DE MODE?
0214 27   06   021C                 BEQ     XYM025     ;NO
                             *
0216 81   45        A               CMPA    #$45       ;IS IT AN "E"   ;YES
0218 27   0B   0225                 BEQ     XYM040     ;YES, VALID FORMAT
021A 20   04   0220                 BRA     XYM030     ;NO
                             *
021C 81   59        A XYM025 CMPA    #$59       ;IS IT A "Y"
021E 27   05   0225                 BEQ     XYM040     ;YES
                             *
                             * ERROR -INVALID FORMAT
                             *
0220 C6   31        A XYM030 LDB     #INVCHR
0222 16   008F 02B4                 LBRA    DEMERR
                             *
0225 C6   05        A XYM040 LDB     #5
0227 BD   00CA      P               JSR     VALNUM     ;VALID "Y" OR "E"?
022A 24   05   0231                 BCC     XYM060     ;YES
                             *
                             *  ERROR - INVALID COMMAND ARGUMENT
                             *
022C C6   33        A XYM050 LDB     #INVARG
022E 16   0083 02B4                 LBRA    DEMERR
                             *
0231 D7   C9        A XYM060 STB     YESIGN     ;SAVE Y/E SIGN
                             *
0233 BD   0000      A               JSR     CASCB      ;CONVERT TO BINARY
0236      00BF      A               FDB     NUMBUF
0238      05        A               FCB     5
0239      00C7      A               FDB     TEMPY
                             *
023B 9E   C5        A               LDX     TEMPX
023D 109E C7        A               LDY     TEMPY
0240 0D   A8        A               TST     DEMODE     ;IN DE MODE?
0242 26   07   024B                 BNE     XYM070     ;YES
                             *
0244 9F   3C        A               STX     NX         ;UPDATE NEXT X
0246 109F 3F        A               STY     NY         ;UPDATE NEXT Y
0249 20   2B   0276                 BRA     XYM100
                             *
024B 9F   41        A XYM070 STX     DD         ;UPDATE D EQUATION
024D 109F 45        A               STY     EE         ;UPDATE E EQUATION
                             *
0250 BD   0000      A               JSR     SFLOAT     ;FLOAT TO 32 BIT INTEG
0253      0041      A               FDB     DD
0255      0041      A               FDB     DD
                             *
0257 BD   0000      A               JSR     SFLOAT
025A      0045      A               FDB     EE
025C      0045      A               FDB     EE
                             *
025E D6   41        A               LDB     DD
0260 0D   C4        A               TST     XDSIGN     ;IS D VAL POS?
0262 27   04   0268                 BEQ     XYM080     ;YES
```

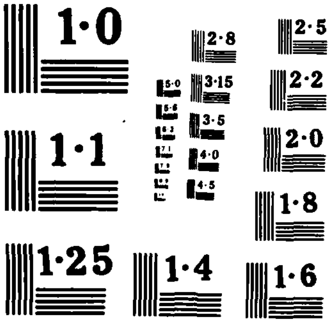
```
  HY11CMDP.SA:0  COMAND COMMAND PROCESSOR

64 CA    80        A           ORB     #$80       ;NO, SET MANTISSA
66 D7    41        A           STB     DD         ;SIGN NEGATIVE
                       *
68 D6    45        A XYM080 LDB     EE
6A 0D    C9        A           TST     YESIGN     ;IS E VAL POS?
6C 27    04    0272            BEQ     XYM090     ;YES
6E CA    80        A           ORB     #$80       ;NO, SET MANTISSA
70 D7    45        A           STB     EE         ;SIGN NEGATIVE
                       *
72 4F                  XYM090 CLRA                ;USE REF 1
73 BD    0000      A           JSR     CXYPF      ;CONVERT TO (X,Y) FORM
                       *
                       *  AT THIS POINT, BOTH PARAMETERS HAVE BEEN V
                       *  CONVERTED AND SIGN ADJUSTED IF NECESSARY.
                       *  ON WITH THE MOVEMENT.
                       *
276 BD   01BC      P XYM100 JSR     UPPROB     ;RAISE PROBE
279 96   A2        A           LDA     CURMOD
27B 81   00        A           CMPA    #AUTMOD    ;IN AUTO MODE?
27D 27   19    0298            BEQ     XYM105     ;YES
                       *
                       *  SEEK POINT RELATIVE TO CAMERA
                       *
                       *
27F BD   0000      A           JSR     MVPOS      ;MOVE TO NEW (X,Y)
                       *
                       *  USER IN MANUAL MODE.  ALLOW TO JOG.
                       *
282 4F                         CLRA
283 BD   0000      A           JSR     JOG
286 26   1F    02A7            BNE     XYM120     ;USER ABORTED
                       *
288 96   A2        A           LDA     CURMOD
28A 81   02        A           CMPA    #TSTMOD    ;ARE WE FINISHED?
28C 27   19    02A7            BEQ     XYM120     ;YES
                       *
                       *  SEEK TRUE POINT
                       *
28E 9E   36        A           LDX     CX         ;UPDATE NEXT
290 109E 39        A           LDY     CY
293 9F   3C        A           STX     NX
295 109F 3F        A           STY     NY
298 86   01        A XYM105 LDA     #1
29A 97   B2        A           STA     UOFSET     ;REQUEST OFFSET WHEN M
29C BD   0000      A           JSR     MVPOS
29F 0F   B2        A           CLR     UOFSET
                       *
2A1 BD   01CE      P XYM110 JSR     DNPROB     ;LOWER THE PROBE
2A4 7D   E710      A           TST     PRSWIT     ;CLOSE SWITCH
2A7 0F   A8        A XYM120 CLR     DEMODE
2A9 39                         RTS
```

```
                         *
                         *  MOVE PROBE TO (D,E) POSITION
                         *
                         *   THE PROBER SOFTWARE HAS BEEN DESIGNED TO
                         *   ONLY MOVE TO (X,Y) COORDINATE POSITIONS.
                         *   THEREFORE,THE (D,E) COORDINATES MUST BE
                         *   TRANSFORMED INTO THEIR RESPECTIVE (X,Y)
                         *   COORDINATES.  ALL OF THE RESTRICTIONS AND
                         *   MODE RULES OF THE XYMOVE ARE VALID AND,
                         *   IN ADDITION, THE (D,E) COORDINATES WILL
                         *   BE IGNORED UNTIL BOTH A ND B ALIGNMENTS
                         *   HAVE BEEN DESIGNATED BY THE HOST.
                         *
                         *     CALLING PARAMTERS:  JSR DEMOVE
                         *
AA 96    A7        A DEMOVE LDA    ABFLAG
AC 84    43        A        ANDA   #$43       ;MASK AB BITS
AE 81    43        A        CMPA   #$43       ;HAS A/B BEEN GIVEN?
B0 27    08    02BA         BEQ    DEM020     ;YES
                         *
                         *  ERROR - A/B ALIGNMENT NOT GIVEN
                         *
B2 C6    35        A        LDB    #UNDFAB
B4 BD    015B      P DEMERR JSR    ERROR
B7 0F    A8        A        CLR    DEMODE     ;RESET MODE (D,E)
B9 39                       RTS
                         *
BA 86    FF        A DEM020 LDA    #$FF
BC 97    A8        A        STA    DEMODE     ;SET TO (D,E) MODE
BE 7E    01E5      P        JMP    XYMOVE
```

AD-A152 687 MANUFACTURING METHODS AND TECHNOLOGY FOR DIGITAL FAULT 2/2
ISOLATION OF HYBRI..(U) HUGHES AIRCRAFT CO FULLERTON CA
GROUND SYSTEMS GROUP 01 MAR 82 HAC-FR-82-12-193
UNCLASSIFIED DAAH01-81-D-A002 F/G 9/5 NL

END
FILMED
DTIC


1·0
2·8
2·5
3·15
2·2
6·0
3·5
1·1
2·0
4·0
4·5
1·8
1·25
1·4
1·6

```
00929                          *
00930                          *  AB HYBRID ALIGNMENT COORDINATES
00931                          *
00932                          *   THIS ROUTINE IS TRIGGERED WHEN THE A/B
00933                          *   ALIGNMENT INFORMATION IS SENT BY THE HOST
00934                          *     FORMAT:
00935                          *                    AX00000AY00000
00936                          *   OR
00937                          *                    BX00000BY00000
00938                          *
00939P 02C1 108E 01AC     A ABALIG LDY     #EXBUFR+2
00940P 02C5 C6   05       A        LDB     #5
00941P 02C7 BD   00CA     P        JSR     VALNUM     ;VALID NUMBER
00942P 02CA 24   12   02DE         BCC     ABAL10     ;YES
00943                          *
00944                          * ERROR - INVALID A/B ARGUMENMT
00945                          *
00946P 02CC 8E   01AA     A ABERR0 LDX     #EXBUFR
00947P 02CF A6   84       A        LDA     ,X         ;GET FIRST CHAR
00948P 02D1 81   41       A        CMPA    #$41       ;IS IT A ALIGNMENTS
00949P 02D3 27   04   02D9         BEQ     ABERR1     ;YES
00950                          *
00951                          *  ERROR- INVALID B ARGUMENT
00952                          *
00953P 02D5 C6   33       A        LDB     #INVARG
00954P 02D7 20   02   02DB         BRA     ABERR
00955P 02D9 C6   33       A ABERR1 LDB     #INVARG
00956P 02DB 7E   015B     P ABERR  JMP     ERROR
00957                          *
00958P 02DE BD   0000     A ABAL10 JSR     CASCB      ;CONVERT X COORD
00959P 02E1      00BF     A        FDB     NUMBUF
00960P 02E3      05       A        FCB     5
00961P 02E4      00C5     A        FDB     TEMPX
00962                          *
00963P 02E6 8E   01AA     A        LDX     #EXBUFR
00964P 02E9 A6   84       A        LDA     ,X
00965P 02EB A1   A0       A        CMPA    ,Y+        ;DO ARGUMENTS MATCH?
00966P 02ED 26   06   02F5         BNE     ABAL20     ;NO, ERROR
00967                          *
00968P 02EF A6   A0       A        LDA     ,Y+        ;GET NEXT CHAR
00969P 02F1 81   59       A        CMPA    #$59       ;IS IT Y
00970P 02F3 27   04   02F9         BEQ     ABAL30
00971                          *
00972                          *  ERROR -COMMAND SYNTAX ERROR
00973                          *
00974P 02F5 C6   30       A ABAL20 LDB     #UNKCMD
00975P 02F7 20   E2   02DB         BRA     ABERR
00976                          *
00977P 02F9 C6   05       A ABAL30 LDB     #5
00978P 02FB BD   00CA     P        JSR     VALNUM     ;VALID Y COORD?
00979P 02FE 25   CC   02CC         BCS     ABERR0     ;NO
00980                          *
00981P 0300 BD   0000     A        JSR     CASCB      ;CONVERT E TO ASCII
00982P 0303      00BF     A        FDB     NUMBUF
00983P 0305      05       A        FCB     5
00984P 0306      00C7     A        FDB     TEMPY
00985                          *
00986P 0308 8E   01AA     A        LDX     #EXBUFR
```

```
00987P 0308 A6   80        A            LDA     ,X+
00988P 030D 81   41        A            CMPA    #$41      ;WAS THIS "A" ALIGNMEN
00989P 030F 26   10   0321              BNE     ABAL50    ;NO
00990                       *
00991P 0311 9A   A7        A            ORA     ABFLAG    ;SET A FLAG TO INDIC
00992P 0313 97   A7        A            STA     ABFLAG    ;THAT A DATA RECEIVES
00993P 0315 9E   C5        A            LDX     TEMPX     ;SET A COORDINATE
00994P 0317 BF   0100      A            STX     RAX
00995P 031A 9E   C7        A            LDX     TEMPY
00996P 031C BF   0102      A            STX     RAY
00997P 031F 20   0E   032F              BRA     ABAL60
00998                       *
00999P 0321 9A   A7        A ABAL50     ORA     ABFLAG    ;INDICATE "B"ALIG
01000P 0323 97   A7        A            STA     ABFLAG    ;WAS SET
01001P 0325 9E   C5        A            LDX     TEMPX
01002P 0327 BF   0104      A            STX     RBX
01003P 032A 9E   C7        A            LDX     TEMPY
01004P 032C BF   0106      A            STX     RBY
01005          84   43        A ABAL60     ANDA    #$43
01006P 032F 81   43        A            CMPA    #$43
01007P 0331 27   03        A            BEQ     ABSET
01008P 0333 39             A            RTS
01009P 0334 12             A            NOP
01010P 0337 12             A            NOP
```

```
01012                            *
01013                            *  NAME: ABSET
01014                            *
01015                            * FUNCTION:  THIS SUBROUTINE WILL ALLOW THE
01016                            *            THE USER TO SET THE A/B ALIGNME
01017                            *            VALUES MANUALLY.
01018                            *
01019                            *    CALLING SEQUENCE:   JSR ABSET
01020                            *
01021                            *    UPON RETURN:     A/B VALUES SET IF PROC
01022                            *                     WAS NOT ABORTED.
01023                            *
01024P 0338 BD   0000      A ABSET  JSR    ONLTE
01025P 033B      30        A        FCB    LABLGN
01026                            *
01027P 033C 9E   36        A        LDX    CX
01028P 033E 9F   94        A        STX    CXSAVE    ;SAVE CURRENT POS
01029P 0340 9E   39        A        LDX    CY
01030P 0342 9F   96        A        STX    CYSAVE
01031P 0344 96   A4        A        LDA    ZDIR
01032P 0346 97   77        A        STA    ZSAVE
01033                            *
01034P 0348 D6   A7        A        LDB    ABFLAG    ;HAS A VAL ALREADY BEE
01035P 034A C5   01        A        BITB   #1
01036P 034C 27   09   0357          BEQ    ABS015    ;NO
01037                            *
01038P 034E BE   0100      A        LDX    RAX       ;GO TO CUURENT VALUES
01039P 0351 10BE 0102      A        LDY    RAY
01040P 0355 20   1A   0371          BRA    ABS020
01041                            *
01042                            *  LEARN THE A REFERENCE POINT
01043                            *
01044P 0357 BD   0000      A ABS015 JSR    ENTER
01045P 035A      04AF      P        FDB    ENTAX
01046P 035C      17        A        FCB    23
01047P 035D      05        A        FCB    5         ;ENTER AX COORD
01048                            *
01049P 035E 26   7A   03DA          BNE    ABS060    ;USER ABORTED
01050P 0360 109F 8C        A        STY    SREFAX    ;SAVE REF AX
01051                            *
01052P 0363 BD   0000      A        JSR    ENTER
01053P 0366      04C8      P        FDB    ENTAY
01054P 0368      17        A        FCB    23
01055P 0369      05        A        FCB    5         ;ENTER REF AY
01056                            *
01057P 036A 26   6E   03DA          BNE    ABS060    ;USER ABORTED
01058P 036C 109F 8E        A        STY    SREFAY    ;SAVE REF AY
01059                            *
01060                            * LOCATE THE A POSITION AND ALLOW TO JOG
01061                            *
01062P 036F 9E   8C        A        LDX    SREFAX
01063P 0371 BD   011D      P ABS020 JSR    LOCATE    ;LOCATE POSITION
01064P 0374 25   50   03C6          BCS    ABS050    ;USER ABORTED
01065                            *
01066P 0376 9F   8C        A        STX    SREFAX    ;HOLD NEW A
01067P 0378 109F 8E        A        STY    SREFAY
01068                            *
01069                            * NOW DO THE SAME FOR THE B POINT
```

```
01070                              *
01071P 037B D6   A7      A                LDB    ABFLAG    ;IS B VALUE KNOWN?
01072P 037D C5   02      A                BITB   #2
01073P 037F 27   09    038A               BEQ    ABS030    ;NO
01074                              *
01075P 0381 BE   0104    A                LDX    RBX       ;GO TOKNOWN LOCATION
01076P 0384 10BE 0106    A                LDY    RBY
01077P 0388 20   1A    03A4               BRA    ABS040
01078                              *
01079                              *  LEARN THE B REFERENCE POINT
01080                              *
01081P 038A BD   0000    A ABS030  JSR    ENTER
01082P 038D      04E1    P         FDB    ENTBX
01083P 038F      17      A         FCB    23
01084P 0390      05      A         FCB    5         ;ENTER BX COORD
01085                              *
01086P 0391 26   33    03C6        BNE    ABS050    ;USER ABORTED
01087P 0393 109F 90      A         STY    SREFBX    ;SAVE NEW REF BX
01088                              *
01089P 0396 BD   0000    A         JSR    ENTER
01090P 0399      04FA    P         FDB    ENTBY
01091P 039B      17      A         FCB    23
01092P 039C      05      A         FCB    5         ;ENTER BY COORD
01093                              *
01094P 039D 26   27    03C6        BNE    ABS050    ;USER ABORTED
01095P 039F 109F 92      A         STY    SREFBY    ;SAVE NEW REF BY
01096                              *
01097                              *  LOCATE THE B REFERENCE POINT
01098                              *
01099P 03A2 9E   90      A         LDX    SREFBX
01100P 03A4 BD   011D    P ABS040  JSR    LOCATE    ;LOCATE B
01101P 03A7 25   1D    03C6        BCS    ABS050    ;USER ABORTED
01102                              *
01103P 03A9 BF   0104    A         STX    RBX       ;UPDATE TO NEW POS
01104P 03AC 10BF 0106    A         STY    RBY
01105                              *
01106P 03B0 9E   8C      A         LDX    SREFAX
01107P 03B2 109E 8E      A         LDY    SREFAY
01108P 03B5 BF   0100    A         STX    RAX
01109P 03B8 10BF 0102    A         STY    RAY
01110                              *
01111                              *  TRANSFORM THE NEW REFERENCE POINTS
01112                              *
01113P 03BC 4F                     CLRA
01114P 03BD BD   0000    A         JSR    CREFD
01115                              *
01116P 03C0 D6   A7      A         LDB    ABFLAG
01117P 03C2 CA   43      A         ORB    #$43      ;SET TO AB KNOWN
01118P 03C4 D7   A7      A         STB    ABFLAG
01119                              *
01120                              *  RETURN TO PREVIOUS POSITION
01121                              *
01122P 03C6 9E   94      A ABS050  LDX    CXSAVE
01123P 03C8 109E 96      A         LDY    CYSAVE
01124P 03CB 9F   3C      A         STX    NX
01125P 03CD 109F 3F      A         STY    NY        ;UPDATE NEXT POS
01126P 03D0 BD   0000    A         JSR    MVPOS
01127                              *
```

```
01128P 03D3 0D    77        A         TST     ZSAVE     ;WAS PROBE UP
01129P 03D5 27    03   03DA           BEQ     ABS060    ;YES
01130P 03D7 BD    01CE      P         JSR     DNPROB
01131P 03DA BD    0000      A ABS060  JSR     OFFLTE
01132P 03DD       30        A         FCB     LABLGN    ;TURN OFF AB LIGHT
01133P 03DE 39                ABABRT  RTS
01134
01135
```

```
01137                          *
01138                          *  HOME THE PROBE
01139                          *
01140                          *     RETURN THE PROBE TO ITS HOME POSITION
01141                          *
01142
01143P 03DF BD    01C2     P HOPROB JSR     UPALWY   ;RAISE THE PROBE
01144P 03E2 C6    03       A        LDB     #3
01145P 03E4 BD    0000     A        JSR     ZTABLE   MOVE TO (0,0)
01146P 03E7 39                      RTS
01147
01148                          *
01149                          *  UNLOAD THE HYBRID
01150                          *
01151P 03E8 7E    0000     A UNLOAD JMP     UNLDKY   ;MOVE TO PARK POS
01152                          *
01153                          *  LOAD THE HYBRID
01154                          *
01155P 03EB 7E    0000     A LOADHY JMP     LOADKY
```

```
                           *
                           *  THE FOLLOWING SET OF SUBROUTINES WILL GATH
                           *   THE REQUESTED INFORMATION AND STORE IT IN
                           *   THE OUTPUT QUEUE. WHEN THE PROBER BECOMES
                           *   A TALKER, THE INFORMATION WILL BE SENT TO
                           *   CONTROLLER VIA IEEE-488 PROTOCOL
                           *

                           *
                           *  SEND (X,Y)POSITION TO CONTROLLER
                           *
                           *    UPON REQUEST OF A 'SP' (SEND X,Y POSITIO
                           *    THIS ROUTINE WILL FETCH THE CURRENT X AN
                           *    POSITION OF THE PROBE, CONVERT IT TO ASC
                           *    ANDSTORE THE INFORMATION IN THE OUTPUT Q
                           *
                           *     CALLING SEQUENCE:    JSR XYSEND
                           *
P 03EE BD   0000      A XYSEND JSR    CBASC    ;CONVERT CUR X TO ASCI
P 03F1      0036      A        FDB    CX
P 03F3      01D4      A        FDB    CXYPOS+1
P 03F5      05        A        FCB    5
                           *
P 03F6 BD   0000      A        JSR    CBASC    ;CONVERT CUR Y TO ASCI
P 03F9      0039      A        FDB    CY
P 03FB      01DA      A        FDB    CXYPOS+7
P 03FD      05        A        FCB    5
                           *
                           *  STORE INFO INTO OUTPUT QUEUE
                           *
P 03FE 108E 01D3      A        LDY    #CXYPOS  ;POINTER TO ASCII INFO
                           *
P 0402 8E   0466      A XYS010 LDX    #OUTBCF
P 0405 E6   A0        A XYS020 LDB    ,Y+      ;GET CHAR
P 0407 BD   0065      F        JSR    PUTCHR   ;FIT IN BUFFER?
P 040A 25   06   0412          BCS    XYS050   ;NO
                           *
P 040C C1   0A        A        CMPB   #STRTRM  ;LAST CHAR?
P 040E 26   F5   0405          BNE    XYS020   ;NO
                           *
P 0410 0C   AE        A        INC    OUTCNT   ;YES, SET OUT COUNT
P 0412 39                XYS050 RTS
```

```
                          *
                          *  SEND (D,E) POSITION TO CONTROLLER
                          *
                          *    UPON REQUEST OF A "SD" (SEND D,E POSITIO
                          *    THIS ROUTINE WILL FETCH THE CURRENT (X,Y
                          *    POSITION AND CONVERT IT TO A 4 BYTE SIGN
                          *    RELATIVE BINARY NUMBER.
                          *
                          *      CALLING SEQUENCE:   JSR DESEND
                          *
0413 96   A7        A DESEND LDA     ABFLAG     ;HAS AB ALIGN BEEN GIV
0415 81   47        A        CMPA    #$47       ;A+B+OFFSET KNOWN
0417 27   05   041E          BEQ     DES010     ;YES
                          *
                          *  ERROR - NOT VALID BECAUSE A/B ALIGNMENT
                          *    HAS NOT BEEN GIVEN BY HOST YET.
                          *
0419 C6   35        A        LDB     #UNDFAB
041B 7E   015B      P        JMP     ERROR
                          *
041E 4F                 DES010 CLRA               ;USE REF 1
041F BD   0000      A        JSR     CDEV       ;CONVERT X,Y TO D,E
0422 86   2B        A        LDA     #$2B       ;ASSUME POSITIVE
0424 0D   41        A        TST     DD         ;IS VALUE OF D POS?
0426 2A   09   0431          BPL     DES020     ;YES
                          *
                          *  NEGATE DD TO MAKE A POSITIVE VALUE
                          *
0428 CC   0000      A        LDD     #0
042B 93   41        A        SUBD    DD
042D DD   41        A        STD     DD
                          *
042F 86   2D        A        LDA     #$2D       ;MAKE - SIGN
0431 B7   01E2      A DES020 STA     CDEPOS+1 ;SAVE SIGN
0434 BD   0000      A        JSR     CBASC      ;CONVERT DD TO ASCII
0437      0041      A        FDB     DD
0439      01E3      A        FDB     CDEPOS+2
043B      05        A        FCB     5
                          *
                          * NOW DO THE SAME FOR THE EE COORDINATE
                          *
043C 86   2B        A        LDA     #$2B       ;ASSUME POS
043E 0D   45        A        TST     EE         ;IS EE POS?
0440 2A   09   044B          BPL     DES050     ;YES
                          *
                          *  NEGATE TO MAKE IT POSITIVE
                          *
0442 CC   0000      A        LDD     #0
0445 93   45        A        SUBD    EE
0447 DD   45        A        STD     EE
                          *
0449 86   2D        A        LDA     #$2D       ;MAKE SIGN NEG
044B B7   01E9      A DES050 STA     CDEPOS+8 ;SAVE SIGN
                          *
                          *  CONVERT EE POSITION TO ASCII
                          *
044E BD   0000      A        JSR     CBASC
0451      0045      A        FDB     EE
```

```
59P 0453        01EA     A          FDB     CDEPOS+9
60P 0455        05       A          FCB     5
61                           *
62P 0456 108E  01E1      A          LDY     #CDEPOS   ;POINTER TO ASCII INFO
63P 045A 7E    0402      P          JMP     XYS010
```

```

                    *
                    *  SEND THE PROBER ERROR CODE
                    *      THIS ROUTINE IS TRIGERRED ONLY WHEN TH
                    *    CONTROLLER REQUESTS WHAT ERROR LAST OCCU
                    *    THE CONTROLLER CAN DETECT A PROBER ERROR
                    *    BY REQUESTING STATUS AND POLLING THE ERR
                    *    BIT (BIT 2) OF THE STATUS BYTE.  THIS ER
                    *    BIT AND THE CODE BYTE WILL BE CLEARED AT
                    *    EXEC LEVEL IF THE NEXT COMMAND FOLLOWING
                    *    ERROR IS NOT EITHER A STATUS REQUEST OR
                    *    THE "SE" (SEND PROBER ERROR REQUEST) COM
                    *    AFTER THE ERROR REQUEST IS SENT THE ERRO
                    *    BIT WILL BE CLEARED AND THE ERROR CODE S
                    *    TO NO ERROR.
                    *
                    *             CALLING PARAMETER:      LDB PROB
                    *                                     JSR ERSE
                    *
045D 34   04      A ERSEND PSHS   B        ;SAVE ERROR CODE
045F 8E   0466    A        LDX    #OUTBCF  ;INIT OUTPUT BCF
0462 CC   04D4    A        LDD    #OUTBUF
0465 108E 0539    A        LDY    #OUTEND
0469 BD   0104    P        JSR    INTBCF
                    *
046C 35   04      A        PULS   B        ;RESTORE CODE
046E 8E   0466    A        LDX    #OUTBCF
0471 BD   0065    P        JSR    PUTCHR
                    *
0474 BD   010E    P        JSR    OTCRLF   ;OUTPUT CR/LF
0477 0C   AE      A        INC    OUTCNT   ;SET FOR REQUEST
0479 39                    RTS

                    *
                    *    FORM STATUS BYTE
                    *  THIS ROUTINE WILL GATHER THE STATE OF SEVE
                    *  FLAGS AND COMBINE THEM INTO A SINGLE BYTE
                    *  AS FOLLOWS:
                    *
                    *     STATUS BYTE CONFIGURATION = 01ZBOEMM
                    *               WHERE:
                    *
                    *     Z = (0/1) PROBE Z POSITION (UP/DOWN)
                    *     B = (0/1) PROBE BUSY (NOT BUSY/BUSY)
                    *     O = (0/1) ONLINE/OFFLINE FLAG
                    *     E = (0/1) PROBER ERROR (NO ERROR/ERROR)
                    *     MM = 00 - AUTOMATIC MODE
                    *          01 - MANUAL/STEP MODE
                    *          10 - TEST MODE
                    *          11 - IDLE MODE
                    *
                    *  THIS ROUTINE IS TRIGGERED WHEN THE CONTROL
                    *  SENDS THE "??" STATUS REQUEST COMMAND.
                    *
                    *        CALLING PARAMTERS:    JSR FORMST
                    *
                    *        RETURN: A-REG CONTAINS STATUS BYTE
                    *
```

```
 047A B6    40         A FORMST LDA    #$40       ;INIT THE STATUS BYTE
 047C 34    02         A        PSHS   A          ;WORK OFF OF STACK
 047E D6    A4         A        LDB    ZDIR       ;CURRENT Z DIRECTION
 0480 C4    20         A        ANDB   #ZBIT
 0482 EA    E4         A        ORB    0,S        ;COMBINE
 0484 E7    E4         A        STB    0,S
                         *
 0486 0D    AF         A        TST    INCNT      ;DEVICE BUSY?
 0488 27    06      0490        BEQ    FORM10     ;NO
 048A C6    10         A        LDB    #BBIT      ;YES
 048C EA    E4         A        ORB    0,S
 048E E7    E4         A        STB    0,S
                         *
 0490 D6    9F         A FORM10 LDB    ONOFFL     ;GET ONLINE/OFFLINE ST
 0492 C4    18         A        ANDB   #OBIT+BBIT ;SET BUSY ALSO IF
 0494 EA    E4         A        ORB    0,S        ;IN OFFLINE
 0496 E7    E4         A        STB    0,S
                         *
 0498 D6    A6         A        LDB    ESTATE     ;CURRENT ERROR STATE
 049A C4    04         A        ANDB   #EBIT
 049C EA    E4         A        ORB    0,S
 049E E7    E4         A        STB    0,S
                         *
 04A0 D6    A2         A        LDB    CURMOD     ;CURRENT OPERATIONS MO
 04A2 C4    03         A        ANDB   #MBIT
 04A4 EA    E4         A        ORB    0,S
 04A6 E7    E4         A        STB    0,S
                         *
 04A8 35    02         A        PULS   A          ;GET FINAL RESULT
 04AA 39                        RTS
 04AB        0000      A ZERO32 FDB     $0,$0
 04AF        45        A ENTAX  FCC     /ENTER AX POSITION:       /
 04C7        0D        A        FCB     $0D
 04C8        45        A ENTAY  FCC     /ENTER AY POSITION:       /
 04E0        0D        A        FCB     $0D
 04E1        45        A ENTBX  FCC     /ENTER BX POSITION:       /
 04F9        0D        A        FCB     $0D
 04FA        45        A ENTBY  FCC     /ENTER BY POSITION:       /
 0512        0D        A        FCB     $0D
 0513        4F        A ONTRGM FCC     /ON TARGET?/
 051D        0D        A        FCB     $0D
 051E        4D        A MOVMSG FCC     /MOVE TO TEST POINT/
 0530        0D        A        FCB     $0D

                         *
                         *  COMMAND TABLE
                         *
 0531        4D        A CMDTBL FCC     /MS/
 0533        FC35      A        FDB     GETMSG-* ;GET MESSAGE
 0535        4D        A        FCC     /M0/
 0537        FC3A      A        FDB     AUTPRB-* ;PROBE MODE TO AUTO
 0539        4D        A        FCC     /M1/
 053B        FC4E      A        FDB     MANPRB-* ;PROBE MODE TO MANUAL
 053D        4D        A        FCC     /M2/
 053F        FC61      A        FDB     TSTPRB-* ;PROBE MODE TO TEST
 0541        55        A        FCC     /UP/
 0543        FC79      A        FDB     UPPROB-* ;RAISE PROBE
 0545        44        A        FCC     /DN/
 0547        FC87      A        FDB     DNPROB-* ;LOWER PROBE
 0549        58        A        FCC     /X/
 054A        00        A        FCB     DONTCR
 054B        FC9A      A        FDB     XYMOVE-* ;MOVE TO X,Y
 054D        44        A        FCC     /D/
 054E        00        A        FCB     DONTCR
 054F        FD5B      A        FDB     DEMOVE-* ;GO TO DE
 0551        48        A        FCC     /HO/
 0553        FE8C      A        FDB     HOPROB-* ;HOME PROBE TABLE
 0555        41        A        FCC     /AX/
 0557        FD6A      A        FDB     ABALIG-* ;A OF AB ALIGN
 0559        42        A        FCC     /BX/
 055B        FD66      A        FDB     ABALIG-* ;B OF AB ALIGN
 055D        55        A        FCC     /UL/
 055F        FE89      A        FDB     UNLOAD-* ;UNLOAD HYBRID
 0561        4C        A        FCC     /LD/
 0563        FE88      A        FDB     LOADHY-* ;LOAD HYBRID

                         *
                         *  STATUS REQUEST PROCESSORS
                         *
 0565        53        A        FCC     /SP/
 0567        FE87      A        FDB     XYSEND-* ;SEND X,Y POSITION
 0569        53        A        FCC     /SD/
 056B        FEA8      A        FDB     DESEND-* ;SEND D,E POSITION
 056D        53        A        FCC     /SE/
 056F        FEEE      A        FDB     ERSEND-* ;SEND ERROR CODE
 0571        FF        A        FCB     EOTCHR

                                END
```

```
PAGE  037  HY11CMDP.SA:0  COMAND COMMAND PROCESSOR

TOTAL ERRORS 00000--00000
TOTAL WARNINGS 00000--00000


 P 03DE ABABRT 01133*
 P 02DE ABAL10 00942 00958*
 P 02F5 ABAL20 00966 00974*
 P 02F9 ABAL30 00970 00977*
 P 0321 ABAL50 00989 00999*
 P 032F ABAL60 00997 01006*
 P 0337 ABAL70 01007 01010*
 P 02C1 ABALIG 00939*01394 01396
 P 02DB ABERR  00954 00956*00975
 P 02CC ABERR0 00946*00979
 P 02D9 ABERR1 00949 00955*
   00A7 ABFLAG 00159*00768 00912 00991 00992 00999 01000 01034 01071
               01116 01118 01211
 P 0357 ABS015 01036 01044*
 P 0371 ABS020 01040 01063*
 P 038A ABS030 01073 01081*
 P 03A4 ABS040 01077 01100*
 P 03C6 ABS050 01064 01086 01094 01101 01122*
 P 03DA ABS060 01049 01057 01129 01131*
DP 0338 ABSET  00012 01024*
   0085 APUERR 00048*
   0000 AUTMOD 00088*00601 00608 00861
   0171 AUTPRB 00010 00600*01376
   0186 AUTPRT 00602 00612*00641 00668
   0086 AXISER 00049*
   00A0 AXISIN 00066*
   0090 AXISTO 00052*
   0032 BADCTR 00035*00247
   0010 BBIT   00095*01333 01338
   0004 BOFFST 00107*00769
   0024 BUFLEN 00104*00213 00220
R       CASCB  00017*00781 00815 00958 00981
R       CBASC  00018*01175 01180 01235 01257
   01E1 CDEPOS 00170*01234 01237 01253 01259 01262
R       CDEV   00019*01222
 P 0531 CMDTBL 00251 01373*
 P 0009 CMIN15 00215*00217
 P 0014 CMIN20 00221*00230
 P 0025 CMIN35 00235*00239
 P 0031 CMIN37 00223 00237 00241*
 P 003D CMIN40 00227 00251*
 P 005F CMIN50 00255 00272*
 P 0061 CMIN60 00268 00273*
 P 0064 CMIN70 00266 00274*
DP 0000 CMINTP 00008 00211*
R       CREFD  00020*01009 01114
   00A2 CURMOD 00139*00600 00609 00628 00637 00656 00665 00690 00712
               00759 00860 00875 01347
R       CUROFF 00016*00607 00635 00663
   0036 CX     00114*00533 00881 01027 01176
   0094 CXSAVE 00171*01028 01122
R       CXYPF  00018*00853
   01D3 CXYPOS 00169*01177 01182 01187
```

```
    0039 CY     00115*00534 00882 01029 01181
    0096 CYSAVE 00172*01030 01123
    0041 DD     00118*00829 00833 00834 00840 00844 01224 01230 01231
                01236
  P 02BA DEM020 00915 00924*
  P 02B4 DEMERR 00766 00773 00802 00811 00920*
    00A8 DEMODE 00160*00431 00789 00822 00892 00921 00925
  P 02AA DEMOVE 00912*01390
  P 041E DES010 01213 01221*
  P 0431 DES020 01225 01234*
  P 044B DES050 01244 01253*
  P 0413 DESEND 01211*01408
 DP 01CE DNPROB 00011 00711*00890 01130 01384
  P 01E0 DNRTN  00692 00714 00723*
    0000 DONTCR 00105*00369 01386 01389
    0087 DSKERR 00050*
 R       DSPL   00020*00517 00524 00579
    0004 EBIT   00097*01343
    0045 EE     00119*00830 00837 00838 00846 00850 01243 01249 01250
                01258
  P 04AF ENTAX  01045 01357*
  P 04C8 ENTAY  01053 01359*
  P 04E1 ENTBX  01082 01361*
  P 04FA ENTBY  01090 01363*
 R       ENTER  00020*01044 01052 01081 01089
    00FF EOTCHR 00106*00392 01411
  P 015B ERROR  00273 00561*00673 00724 00920 00956 01219
    0165 ERRTN  00563 00569*
    045D ERSEND 01284*01410
    00A6 ESTATE 00158*00262 00567 01342
    01AA EXBUFR 00155*00212 00219 00252 00580 00775 00939 00946 00963
                00986
 R       FLSHYN 00021*00520
  P 0490 FORM10 01332 01337*
 DP 047A FORMST 00009 01324*
 R       FPSUB  00019*
  P 009A GETC30 00337 00342*
 DP 0086 GETCHR 00008 00222 00236 00329*
  P 0168 GETMSG 00579*01374
 DP 03DF HOPROB 00011 01143*01392
    0003 IDLMOD 00085*00660 00691 00713 00760
    0081 IEEEER 00044*
    045E INBCF  00152*00221 00235
    00AF INCNT  00154*01331
 DP 0104 INTBCF 00009 00472*01288
    0033 INVARG 00036*00810 00953 00955
    0031 INVCHR 00034*00801
 R       JOG    00019*00528 00872
    0030 LABLGN 00029*01025 01132
    0045 LAUTO  00025*00611
    0083 LIMERR 00046*
  P 03EB LOADHY 01155*01400
         LOADKY 00021*01155
    0128 LOC010 00517*00529
    011D LOCATE 00512*01063 01100
  P 013F LOCRT1 00522 00531*
  P 0142 LOCRTN 00521 00533*
    0040 LSTEP  00027*00640
```

```
   0042 LTEST  00026*00667
   0033 LUPDWN 00028*00698 00720
   0189 MANPRB 00010 00628*01378
   019E MANPRT 00630 00641*
DP 009F MATCH  00012 00254 00362*
 P 00A4 MATCH2 00368*00377 00396
 P 00AE MATCH3 00370 00375*
 P 00B6 MATCH5 00373 00387*
 P 00C7 MATCH7 00393 00398*
   0003 MBIT   00098*01348
   0060 MOVEZ  00127*
 P 051E MOVMSG 00525 01367*
   00A0 MTCNT  00156*00363 00395
DP 0148 MVPARK 00012 00543*
R       MVPOS  00018*00515 00548 00867 00887 01126
   0036 NOFSET 00039*00772
   00BF NUMBUF 00162*00443 00782 00816 00959 00982
   003C NX     00116*00512 00545 00825 00883 01124
   003F NY     00117*00513 00546 00826 00884 01125
   005E NZ     00120*
   0008 OBIT   00096*01338
R       OFFLTE 00017*00697 01131
R       ONLTE  00016*00610 00639 00666 00719 01024
   009F ONOFFL 00168*00562 01337
 P 0513 ONTRGM 00518 01365*
   0080 OPABRT 00043*
DP 010E OTCRLF 00009 00485*01294
   0466 OUTBCF 00153*01189 01285 01291
   04D4 OUTBUF 00142*01286
   00AE OUTCNT 00141*01197 01295
   0539 OUTEND 00143*01287
   00A9 OVRFLW 00167*00211 00247 00265
   4E20 PARKX  00108*00543
   4E20 PARKY  00109*00544
 P 01B7 PRBERR 00605 00633 00661 00672*
   00A3 PROBER 00138*00260 00261 00565
   E710 PRSWIT 00182*00891
 P 0074 PUTC10 00300 00305*
 P 007C PUTC20 00309*00343
 P 0081 PUTC30 00306 00313*00333
DP 0065 PUTCHR 00008 00294*00488 00490 01191 01292
   0100 RAX    00122*00994 01038 01108
   0102 RAY    00123*00996 01039 01109
   0104 RBX    00124*01002 01075 01103
   0106 RBY    00125*01004 01076 01104
DP 015F RERROR 00012 00565*
R       SFLOAT 00018*00832 00836
   00CF SRCPTR 00157*00364 00394
   008C SREFAX 00175*01050 01062 01066 01106
   008E SREFAY 00176*01058 01067 01107
   0090 SREFBX 00177*01087 01099
   0092 SREFBY 00178*01095
   0001 STPMOD 00087*00629 00636
   000A STRTRM 00103*00226 00238 01194
R       TCLRDP 00020*00582
   00C5 TEMPX  00163*00784 00820 00961 00993 01001
   00C7 TEMPY  00164*00818 00821 00984 00995 01003
R       TOUCHD 00017*00716
```

```
    0084 TRSHER 00047*
    0002 TSTMOD 00086*00604 00632 00657 00664 00876
L   01A0 TSTPRB 00010 00656*01380
 P  01B5 TSTRTN 00658 00668*
    0035 UNDFAB 00038*00919 01218
    0030 UNKCMD 00033*00272 00974
    0082 UNKINT 00045*
R        UNLDKY 00021*01151
 P  03E8 UNLOAD 01151*01398
    00B2 UOFSET 00128*00886 00888
 P  01C2 UPALWY 00514 00547 00694*01143
DP  01BC UPPROB 00011 00689*00859 01382
 P  00CE VAL010 00427*00429
 P  00E4 VAL030 00432 00438 00442*
 P  00E6 VAL050 00435 00441 00443*
 P  00E9 VAL060 00444*00452
 P  00FF VALERR 00446 00448 00459*
 P  00CA VALNUM 00423*00777 00805 00941 00978
    009E VALSGN 00161*00425 00440 00455
    0034 WRGMOD 00037*00672 00723 00765
    00C4 XDSIGN 00165*00779 00841
    007B XOFFS  00129*
 P  01F0 XYM010 00761 00768*
 P  01FB XYM020 00770 00775*
 P  021C XYM025 00790 00796*
 P  0220 XYM030 00794 00801*
 P  0225 XYM040 00793 00797 00804*
    022C XYM050 00778 00810*
    0231 XYM060 00806 00813*
 P  024B XYM070 00823 00829*
 P  0268 XYM080 00842 00846*
 P  0272 XYM090 00848 00852*
 P  0276 XYM100 00827 00859*
 P  0298 XYM105 00862 00885*
 P  02A1 XYM110 00890*
 P  02A7 XYM120 00873 00877 00892*
 P  01E5 XYMOVE 00759*00926 01387
 P  0402 XYS010 01189*01263
 P  0405 XYS020 01190*01195
 P  0412 XYS050 01192 01198*
 P  03EE XYSEND 01175*01406
    00C9 YESIGN 00166*00813 00847
    007A YOFFS  00130*
    0020 ZBIT   00094*01327
    00A4 ZDIR   00137*00699 00718 01031 01326
 P  04AB ZERO32 01356*
    0077 ZSAVE  00173*01032 01128
R        ZTABLE 00019*00695 01145
```